THE PAPER TRADE JOURNAL.

"The Consumption of Paper is the Measure of a People's Culture."

VOLUME XXVI.—NO. 42. NEW YORK, OCTOBER 16, 1897. WHOLE NUMBER 1224.

HOWARD LOCKWOOD,

The Founder of The Paper Trade Journal.

HOWARD LOCKWOOD, the founder of THE PAPER TRADE JOURNAL, was born at White Plains, Westchester County, N. Y., on March 9, 1846. He was the son of General Munson I. Lockwood, and was a lineal descendant of Robert Lockwood, first of the name in the United States, who was an emigrant from England in 1630, and who settled at Watertown, Mass. The descendants of Robert Lockwood took an active part in the Colonial and Revolutionary wars, twenty-three of them having participated in the former conflict, and nearly 200 of them in the latter. On his mother's side Mr. Lockwood was descended from Nicholas Delaplaine, a distinguished Huguenot, who came to America and settled on Manhattan Island, where he died in 1790.

In 1865 Mr. Lockwood came to New York and secured employment in a Duane street paper house. He applied himself to his new duties with industry and intelligence, and soon acquired a very thorough knowledge of the business, together with an understanding of the scope, extent and processes of paper manufacture.

In the spring of 1872, believing that there existed the necessity for a representative paper in the paper trade, he established THE PAPER TRADE JOURNAL. The ideas which he held as to the conduct of such a paper may be seen, succinctly stated, in the prospectus which appeared in the initial number, and which is reprinted on page 8 of this issue. There was a great deal of opposition to the proposition to establish such a paper, many of those engaged in the making and selling of paper expressing the belief that there would be entirely too much news furnished to people, and that readers would come into the possession of information which in those days of comparatively slow communication was held by only the few. These reasons, presented to him in forcible shape, did not deter Mr. Lockwood in the slightest. On the contrary, they emphasized the necessity for such a paper.

He began the publication in a modest way, bringing it out at first as a semi-monthly of four pages. It was very evident from the start that he intended to print all the news which he could obtain, and to print it in a dignified, forceful style, which would commend his undertaking to every serious, sensible man whose commendation was worth having. That his judgment was well founded, and that he was right and his critics wrong as to the matter, has been settled emphatically by the position which THE JOURNAL has always occupied as the leader since its first issue. Mr. Lockwood had of course a very wide acquaintance in the trade, and his opinions, which were well matured before they were expressed, were respected even by those who disagreed with him. In the conduct of THE JOURNAL he was eminently fair, and in considering the line of policy to be pursued as to any given matter he held firmly and tenaciously to his original determination to print a paper which should contain not only all the news but which should be a reflection of the progress of the entire trade in all its departments from week to week. He believed that the editorial and news end of the paper should be conducted entirely uninfluenced by the business office. Not only was that his belief, but it was his practice. If the true story of an event of sufficient trade interest to warrant publication was presented to him he always and invariably insisted that it be printed for the benefit of the entire trade, without any regard to whether those whom it affected were or were not represented in the advertising columns of THE JOURNAL. He founded THE JOURNAL as an independent trade paper, and he never deviated a straw from that line of policy. He was not trained in the newspaper business, but he possessed that tact and judgment which led him in the right direction, and which made of his work the success that it was.

He had an abhorrence of shams, particularly of those in the trade, and he neglected no opportunity to expose them. In the course of its twenty-five years of successful life THE JOURNAL has had occasion in many instances to attack trade shams and it has never hesitated to do its whole duty in that respect.

A few years after THE JOURNAL was started Mr. Lockwood saw the need of having a printing plant directly under his own control, and he at once purchased and installed a complete office, thus adding to his title of publisher that of printer.

HOWARD LOCKWOOD,

FOUNDER OF THE PAPER TRADE JOURNAL.

In 1873 he issued the first volume of Lockwood's Directory. In 1874 he developed the stationery department of THE PAPER TRADE JOURNAL into a distinct publication known as *The American Stationer*, now in the twenty-third year of separate existence, and in 1885 the bookmaking department of THE JOURNAL was put before the public as a separate entity under the title of the *American Bookmaker*, now *The Printer and Bookmaker*. He also published technical books, among them "The Chemistry of Paper Making," by Griffin & Little, the well-known paper mill chemists, which is in every way a standard work, and "The Dictionary of Printing and Bookmaking," which has taken high rank among technical books, and which is the most ambitious and complete publication of its class.

When the old New York Typothetæ, or master printers' society, was revived, Mr. Lockwood took an active part in its proceedings, and when the United Typothetæ or national organization was proposed the plan at once enlisted his hearty and enthusiastic co-operation. He attended the first meeting in Chicago, where the national body was formed, being a delegate from the New York Typothetæ, and he drafted the constitution which formed the basis of action of the new society. His interest never lagged in either the New York or the United Typothetæ, and his suggestions and work, born of experience, contributed in no small degree to the success of both organizations. At the first meeting of the United Typothetæ he was elected chairman of the executive committee, and was chosen to the same position at each of the two succeeding annual meetings. He was a delegate to every meeting after the first, except the one held in Boston, from which he was absent by reason of his being abroad at the date of the gathering.

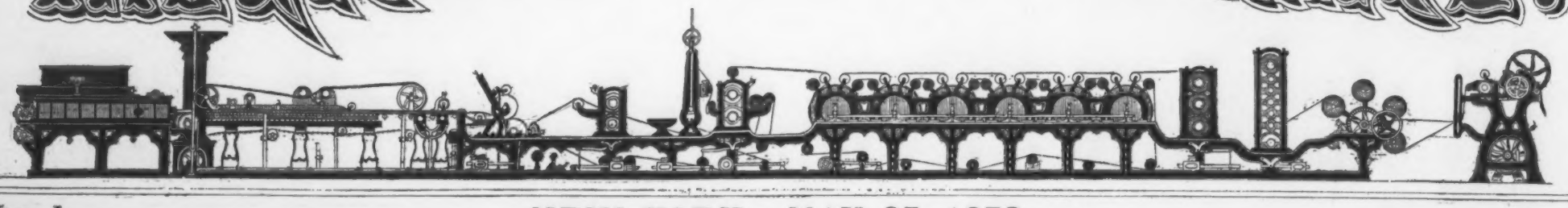
Mr. Lookwood took a deep interest in everything which was connected with the paper and allied trades, and always, both by word and act, aided every movement which had for its object the benefiting of those engaged in any of these lines. He was a close observer of the work of the American Paper Manufacturers' Association, now the American Paper and Pulp Association, and he gave assistance to that work whenever and wherever he could. He believed that the association should be of more practical and substantial service to its members than it has been, and he expressed on many occasions his regret that more work along those lines had not been done. Mr. Lockwood inaugurated the plan of preparing each year for the benefit of the trade a table showing the capacities per day of the paper mills in operation in the country, quantities being given both by States and by grades. This table he regularly presented each year at the summer meeting of the association, it being also laid before the whole trade through the columns of THE PAPER TRADE JOURNAL. He, however, always felt that there should be further statistical information as to the trade, and on the last occasion on which he addressed the association, at one of the midsummer gatherings at Saratoga, he spoke at some length on this subject, arguing that the association, as the national body representing the entire trade, should undertake to gather and put forth to those within its ranks statistical bulletins, showing in detail all those facts which are necessary to fully weigh the importance of one line of industry as compared with others, the vital point in such a scheme to be the collection particularly of figures showing actual production. He stated that he had no wish to undertake the task if the association intended to do it, but that he should do so if the association failed to cover the ground. The subject was taken up in the association, and it is likely before long that there may be something done along the lines suggested.

Mr. Lockwood also published each year in pamphlet form the proceedings of the annual meetings of the association, distributing the booklets not only to those in attendance, but to every paper and pulp mill in the country, so that every manufacturer could see what the association was doing. This labor on his part was greatly appreciated, and each year the association formally thanked him by resolution.

Mr. Lockwood died suddenly in his own home on November 4, 1892. His death was a great shock, and the announcement of it brought regret to many both in and out of the trade.

THE PAPER TRADE JOURNAL and its sister papers continue to occupy their old positions as leaders in the various trades and industries, and are published by the Howard Lockwood Publishing Company, of which the widow of Mr. Lockwood, now Mrs. Alers-Hankey, is president.

THE PAPER TRADE JOURNAL.



VOL I. NEW YORK. MAY 27, 1872. No. 1.

THE TARIFF ON PAPER, BOOKS, TYPE, &c.

The following report of the debates in the House of Representatives on the Tariff will interest all our readers.

[illegible] went into Committee of the Whole, [illegible] on the Tariff and Tax [illegible].

Sal-soda and Soda-ash.

Mr. Sypher moved to strike out the item taxing sal-soda and soda-ash one quarter cent per pound.

After its discussion, the amendment was rejected.

Books and Paper.

Mr. Hoar moved to add to the item taxing books, &c., twelve and a half cents per pound, an exception of such as are imported in public libraries, colleges, schools, philosophical societies, &c.

Mr. Kerr moved to reduce the rate to ten cents per pound.

Mr. Holman moved to put books on the free list.

Mr. Banks argued in favor of fixing the duty on books as low a rate as consistent with the interests of American publishers. He thought that a reduction from twenty-five per cent. ad valorem to ten or fifteen per cent. should be made.

Mr. Dawes opposed the proposition to put books on the free list, and referred to the fact that, even under the present tariff, the gentleman from New York—Mr. Cox—had found it to his pecuniary interest to have his late book of travels printed in England, and to pay duty on it here. It was mortifying to him to see an Englishman (alluding to Frank Leslie) squatting beside members and whispering to them, like the serpent at the ear of Eve, that he might have the privilege of going to England and getting his paper printed there. He did not have any sympathy with this effort to thus cripple American publishing houses.

Mr. Cox said he had got his book printed in England—not bound—because he found that he could pay the twenty-five per cent. duty, and still have the book twenty-five per cent. cheaper than Mr. Dawes asked whether Mr. Cox wanted others to have their books published in England.

Mr. Cox said he did not, but he would let the poor author go anywhere he chose to have his book printed. As to the question of competition with cheap labor, he reminded Mr. Dawes that the State of Massachusetts had introduced cheap pagan labor, chop-sticks, pig-tail and all, to compete with their own enlightened Christian labor.

Mr. Banks said that what he wanted to know, and what Mr. Leslie wanted to know, was, what was the lowest rate at which paper might be imported here without detriment to the paper manufacturers of this country. The fact of Mr. Leslie having been born in England was not a material question. He had been engaged on *Gleason's Pictorial* in Boston in 1850, and had since been exceeding the art of illustration which, if continued, would advance the time when daily journals of the country would be printed with illustrations.

Mr. Dawes regretted his allusion to Mr. Leslie, but he thought it strange that he should want to buy his paper abroad while Harper's and other illustrated newspapers bought their paper here. It was unfortunate that such a condition of things existed that Americans could go abroad and employ the labor of Belgium at fifteen cents a day, with bleaching powder, free of duty, with soda free of duty, and with an export duty on rags. He could not understand how the American sentiment in a man's breast slept under such circumstances.

Mr. Kerr characterized Mr. Dawes' allusion to fifteen cents a day labor as mere stuff. Notwithstanding the cheap labor of Belgium and some of the German States, Great Britain was the book-manufacturing country of Europe. That country made more books and printed more literature and did more for the civilization of the world than all the rest of Europe, and it did so by the aid of free trade.

Mr. Finkelburg remarked, that a person listening to the tariff debate might imagine that all the industries of the country were carried on under the co-operative system, and that all the bounties derived under the tariff legislation went directly into the pockets of the laborers, while in 99 cases out of 100 they went into the pockets of the employers. The laborer was not paid a cent more than the general rate of wages required, no matter how high the protective duty which the employer had the benefit of. The difference of wages in America and in Europe was not a consequence of tariff legislation. It existed before the war, and was due to a variety of circumstances.

Mr. Holman thought it a most humiliating thing that the Government should impose a tax on learning—a tax by the avoirdupois—and reminded Mr. Dawes that the Germans, Swedes, Norwegians and representatives of other nationalities in the country must draw their books from their mother countries, and that consequently this tax was especially hard on them. He suggested that at least all school-books should be admitted free of duty.

Mr. Butler, of Massachusetts, referring to the increased prosperity of the American laborer, illustrated it by showing that in one of the large woolen manufactories of Lowell, Mass., with which he was familiar, the relative cost of labor to production was, from fifteen to twenty years ago, twelve and a half per cent., and is now nineteen per cent. He did not claim, however, that the tariff system had produced that improvement. There were other causes at work which were generally overlooked.

Mr. Townsend, of Pennsylvania, gave other illustrations of the improved condition of American labor.

Mr. Beatty, while admitting that this bill might prove beneficial to the country, argued that the ten per cent. reduction on wool would be injurious to the wool-growing interest, which had been for many years prior to 1846 outraged, swindled, plundered by tariff laws.

At [illegible] the discussion [illegible] the committee proceeded to vote on the pending amendments.

Mr. Holman's amendment making school-books, charts and maps used by common schools, Bibles and Testaments, free of duty, was rejected—49 to 72.

Mr. Kerr's amendment to reduce the duty on books from twelve and half cents to ten cents per pound was rejected—75 to 78.

Mr. Hoar's amendment was agreed to, and also one offered by Mr. Garfield, excepting books in foreign languages, and English editions of old works untouched for twenty years.

Mr. Dawes moved to put the duty on all paper at ninety per cent. of the existing duties, as a substitute for the paragraph taxing sized printing-paper twenty-eight per cent. Agreed to—84 to 78.

The portion of the bill as passed on by the Committee to-day, makes the following provisions:

On printed books and all other printed paper, bound or in sheets, except newspapers, magazines and periodicals, except for public libraries, colleges, schools, philosophical societies, &c., and except books in foreign language or English editions of old books unrevised in twenty years, 12½ cents per pound; on newspapers, magazines and periodicals unbound 6 cents per pound; on all paper, 90 per cent. of existing duties.

SECOND DAY.

WASHINGTON, May 17th.—The House went into Committee of the Whole, Mr. Bonkell in the chair, on the Tax and Tariff bill.

Mr. Brooks (Dem., N. Y.) offered an amendment to the item on paper, which was fixed yesterday at 90 per cent. of the existing duties, providing that the duty on printing-paper, whether sized or unsized, shall be equal, and 20 per cent. ad valorem—agreed to by 80 to 56.

Mr. Beck (Dem., Ky.) moved to insert a paragraph authorizing one-half of the customs duty to be paid in legal-tender notes.

Mr. Beck accepted that modification.

Mr. Sargent (Rad., Cal.) offered as a substitute to make the notes of Gold Banks, duly organized under the United States laws, receivable for import duties. Rejected.

Mr. Beck's proposition, making one-third of the duties payable in legal notes, was agreed to—94 to 62.

Mr. Blair (Rad., Mo.) moved to make the duty on type, type-metal, and stereotype plates 10 per cent. ad valorem.

Mr. Brooks moved to add to Mr. Blair's amendment the words, "and on lead and other materials that enter into type-casting, 10 per cent. ad valorem." Rejected—57 to 77.

Mr. Blair's amendment was also rejected.

Mr. Harris (Dem., Va.) moved to insert printers' type. Rejected.

Mr. Holman (Dem., Ind.) moved to insert printing paper. Rejected.

Mr. Garfield moved to add to the free list books printed in foreign languages and books in the English language of an edition unrevised in twenty years. Agreed to.

Mr. Sargent moved to insert jute butts. Agreed to.

Motions were made and rejected to put on the free list medicinal books, fire-wood, leather, newspapers, sal soda, cotton waste, books used in colleges and schools, old white hats and coats, wheat and the Holy Bible.

The committee passed to the sections following the free list.

THE SANITARY AUTHORITIES AND THE IMPORTATION OF RAGS.

Fearing the spread of contagious diseases, about six months since the Board of Health in this city passed a resolution forbidding the landing of rags from vessels at any of our docks and piers, except under such severe restrictions as to shut them out almost entirely, and as the importation of this material for supplying the paper mills is an extensive business interest in this city, there was considerable consternation among importers of rags. By the new law they were allowed to land the rags under certain conditions, but could not store them nor open the bales in the city under any circumstances. After a little time, however, the consignees had their cargoes sent to storehouses along the Brooklyn water front, where they were kept until shipped to the interior, or to other parts, there being no paper mills in this city, consequently no demand for consumption. But the Brooklyn Health authorities took the alarm also, and adopted a similar anti-rag ordinance, and the importers were left no resort but to send their bales of rags by a roundabout route to New Jersey for reception and storage, since which time, they claim, their business has fallen off very materially, and it has hardly been profitable to bring rags to this port, importations being sent to Baltimore, Philadelphia, Boston, and other ports where no such sanitary restrictions prevail. The rag men claim that the restrictions on their business are unnecessarily severe, and have presented a petition, with many signatures, to the Board of Health, asking for their removal. Congress has encouraged the importation by placing rags on the free list, and they contend that the danger of infection from rags is not so great as claimed, and that the health laws are too stringent.

At the weekly meeting of the Board of Health on May 15th, the Sanitary Committee recommended that rags be allowed to be landed at this port under the supervision of the Sanitary Committee, the consignees being required to give a written guarantee not to open the bales in this city. The resolution called forth considerable debate. The Health Officer urged its passage and stated that there was very little danger of infection from rags. This was opposed by Commissioners Manierre and [illegible], and the matter was finally referred to the Committee on Law and Ordinances.

Most of the rags brought from abroad to this country come from Southern Europe, Italy principally, but some from Spain, Austria and Algeria in Africa. Of late Russia has also been contributing largely to our supply of paper stock. The importers generally are willing to pledge themselves not to open the bales in this city, for the reasons above stated, that they are sent direct to the paper mills, none of which are in this vicinity. They hope the Board of Health will grant their petition. One said that he is sure that a single one of the numerous local junkmen and rag-dealers who, unrestricted, receive the collections of the ragpickers from the dirtiest, vilest and most unwholesome tenement house quarters of the city, does far more toward aiding the dissemination of disease than all the rag importers together. The importers and consignees, to carry on their business at present, are driven to evading the ordinance of the Health Board as to the landing of their rags in the following manner: When a vessel arrives they do not enter their goods at the Custom-house, nor claim them in any way whatever, so that when the ship discharges, the goods after the usual forty-eight hours delay, are sent with all other unclaimed packages to the regular General Order warehouse of the district designated by the Collector of the Port. When the consignee or owner has disposed of his rags, he claims his property at the warehouse, pays the cartage, storage and other charges, and takes them away. But these transfers and charges bring the expenses of the owner and dealer to such a point that, as they allege, the business scarcely pays.

ANGLO-AMERICAN COPYRIGHT.

MEMORIAL OF BRITISH AUTHORS ON COPYRIGHT IN THE UNITED STATES.

The following memorial of British authors, on the subject of Copyright in the United States of America, was sent to the Right Hon. Earl Granville on Friday, April 19, by Mr. William Gilbert, the honorable Secretary:—

Looking forward with satisfaction to the prospect of harmonious relations being happily established between the United States and the United Kingdom, we, the undersigned, hope for a reconsideration of the policy in virtue of which authors, as authors, enjoy no rights which American citizens are bound to respect. Letters from influential Americans—one of them a leading New York publisher—which have recently appeared here, joined with the approval of them expressed in the journals of the United States, show the desire of the Americans for the conclusion of a Copyright Convention between that country and ours. We understand that the demands of publishers in this country have hitherto been the most formidable obstacles to the negotiations of a Copyright Convention. We are of opinion that the interests of our publishers in American copyrights are quite independent of the just claims of British authors, and that the latter may be fully admitted without recognition of the former. We think it would be a grave error if the settlement of this matter were retarded or rendered impossible, in consequence of two classes of claims, which in essence are wholly distinct, if not antagonistic, being regarded by negotiators representing this country as identical and inseparable. Americans distinguish between the author, as producing the idea, and the publisher, as producing the material vehicle by which the ideas are conveyed to readers. They admit the claim of the British author to be paid by them for his brain work. The claim of the British book manufacturer to a monopoly of their book market they do not admit. To give the British author a copyright is simply to agree that the American publisher shall pay him for work done. To give the British publisher a copyright is to open the American market to him on terms which prevent the American publisher from competing. Without dwelling on the argument of the Americans that such an arrangement would not be free trade, but the negation of free trade, and merely noticing their further argument, that while their protective system raises the prices of all the raw materials, free competition with the British book-manufacturer would be fatal to the American book manufacturer, it is clear that the Americans have strong reasons for refusing to permit the British publisher to share in the copyright which they are willing to grant to the British author. We venture to suggest, therefore, that, responding to the cordial feeling recently expressed by Americans on the subject, and duly appreciating the force of their reasons for making the above distinction, future negotiations should be conducted with a view to secure a copyright on the conditions they specify. Without making it the foundation of a former claim for reciprocity of treatment, we mention the fact that American authors may, if they please, secure all the advantages of copyright in the United Kingdom which are enjoyed by native authors.

Rev. Edward Henry Bickersteth, Sir John Lubbock, Bart., M.P.; Thomas H. Huxley, F.R.S.; Thomas Hughes, M.P.; Rev. Dr. T. Guthrie, Rev. Wm. Arthur, Philip James Bailey, J. E. Hilary Skinner, J. B. Leicester Warren, Rev. Harry Jones, Rev. J. Martineau, Andrew Edgar, L.L.D., W. Durrant Cooper, F.S.A.; Joseph Dalton Hooker, M.D., F.R.S., Harriet Martineau, John Percy, M.D., F.R.S.; George Scharf, F.S.A.; Thomas Blizard Curling, George Augustus Sala, Robert Buchanan, Henry Labouchere, Augustus W. Franks, Vice-President Society of Antiquaries; Richard A. Proctor, Blanchard Jerrold, Herbert Spencer, G. H. Lewis, John Stuart Mill, Henry Taylor, J. A. Froude, T. Carlyle, John Ruskin, John Morley, W. T. Hall, C. Cooper, Eliza Tabor, William Black, Edward Dicey, James Caird, William Gilbert, Sheldon Amos, Erwin Pears, James Payn, Archibald Forbes, J. C. Parkinson, W. T. McCullagh Torrens, M.P.; Charles Darwin, Erastus Wilson, Shirley Brooks, Tom Hood, Justin McCarthy, John Tyndall, F.R.S.

A reply to the above memorial has been received as follows:

FOREIGN OFFICE, May 2, 1872.

SIR.—I am directed by Earl Granville to acknowledge the receipt of your letter of the 19th ult., enclosing a memorial of British authors on the subject of copyright in the United States, and His Lordship desires me to state to you that the subject will receive the careful attention of Her Majesty's government.

I am, yours, &c.,

WILLIAM GILBERT, Esq. ENFIELD.

INCORPORATIONS.

RAMSBOTTOM PAPER MILL.

This company proposes to acquire letters patent, for producing paper pulp from wood, granted 13th July, 1870, to David Adam Fyfe, and to purchase a mill at Ramsbottom, Lancashire. It was registered 25th inst., with a capital of £60,000, in £10 shares, and the following are the first subscribers:—

	SHARES.
*Thomas Hutchison, 3, Clarence-street, Manchester, merchant	100
*Ernest Delfils, 3, Parsonage, Blackfriars, Manchester, merchant	100
*William Rumney, 44, George's-street, Manchester, calico printer	500
*Ferguson Mason, Newton Paper Mills, Newton-le-Willows, Lancashire	100
David Adam Fyfe, 100, Brunswick-street, Oxford-road, Manchester, paper maker	100
Parr Mason, jun., 24, St. Ann's-place, Manchester, engineer	200
Lawrence Hall, 58, Mosley-street, Manchester, manufacturer	100

Those marked with an asterisk are to be the directors, with the addition of James Park, engineer, Fernhill-foundry, Bury, and Edward Partington, Bury, Lancashire. Qualification, 100 shares.

COLONIAL AND FOREIGN FIBRE CO.

This company was registered 25th ult., with a capital of £100,000, in shares of £5, to acquire letters patent for the treatment of fibre-bearing plants and machinery applicable to England and New Zealand. The first subscribers are:—

	SHARES.
*Geo. Jno. Luckie, Spring-hill, Sydenham, Kent, merchant	500
*Henry W. Petre, Chelmsford, Essex	370
*George Tinline, 17, Princes Square, Bayswater, gentleman	1,200
*Edward Kynaston, 24, Mincing-lane, E. C., colonial broker	1,000
*Charles Nichols, 121, Bishopsgate-street, E. C., merchant	250
*John Clarke, The Dingle, Sydenham-hill, Kent, Major-General	100
Thomas Nichols, 121, Bishopsgate-street, E. C., merchant	250
*J. B. Minlees, 45 Scotland-street, Glasgow, engineer	2,000

Each director must hold at least 100 shares in the company.

The first directors are those whose names are marked with an asterisk, and are to be not less than five nor more than seven. Remuneration, £700 per annum.

BROOK MILLS WOOD PULP CO.

This company proposes to acquire the Brook Paper Mills at Little Eaton, Derby, from Messrs. Tempest and Harvey, and to carry on same for the manufacture of paper and cardboard from wood pulp. The company was registered 2d inst., with a capital of £20,000, in 400 shares of £50 each, the following being the first subscribers:

	SHARES.
Roger Datton Mills, Keyham, Leicester, land agent	20
George Alfred Rothman, Belgrave, Leicester, gas engineer	10
Charles Angrave, Belgrave, Leicester, manufacturer	20
G. H. Wade, Belgrave, Leicester, wine merchant	20
Charles S. Robinson, Leicester, gas engineer	10
Alfred B. Simpson, Renowash, near Derby, solicitor	40
Alfred Robinson, Belgrave, Leicester, gas engineer	40

Directors to be not less than 5 nor more than 7. Qualifications, 10 shares. Subscribers to appoint first directors, and act *ad interim*.

LONDON PAPER STOCK CO.

This company proposes dealing in all materials for making paper, and was registered 4th inst., with a capital of £10,000, in shares of £5 each. The following are the first subscribers: *James Goodwin, Liverpool, merchant; S. E. Darrock, Oakholme, Wimbledon; J. H. Highmore, Everton, clerk; *John Jowett, Hill House, Hington, Lancaster, broker; A. Bland, Egremont, Chester cashier; S. M. Gladwin, Liverpool, merchant; G. H. Sharp, Liverpool, salesman. Directors to be not less than 3 nor more than 10. First directors to be those whose names are marked with an asterisk and Amos H. Cobb, New York, merchant. General meeting to determine remuneration. Mr. Goodwin is appointed managing director, and Mr. S. E. Darrock as manager of the company.

The Akron Straw Board Company has been incorporated for the purpose of manufacturing straw board, straw paper, printing, writing and wrapping paper at Akron, Summit County, Ohio. Capital stock $180,000.—Corporators, O. C. Barber, Jacob H. Wise, Lewis Miller, John R. Buchtel and David L. Rhodes.

The Calcutta Jute Mills have been registered in England, with a capital of £100,000, in shares of £20 each, to acquire the Ishera Jute Mills in Bengal, and to carry on the manufacture and sale of jute there.

During the month of March six new printing and publishing companies were incorporated in London.

THE LAW OF COPYRIGHT.

The American law protects copyright for twenty-eight years, with the privilege of extension to the surviving family for fourteen years more, but exclusively to Americans. There is a movement now on foot to extend the same privileges to foreigners; but it is not agreed as yet if it will be granted to the authors alone or also to the foreign publishers; we hope the authors alone will obtain the privilege. In England the law protects copyright forty-two years from the date of publication; in Sweden for only twenty years; but it falls to the State if the author or publisher neglects to keep the books continually for sale; in France it is protected during the whole lifetime of the author, and twenty years after his death for the benefit of his heirs—no distinction being made between native or foreign authors. This law was enacted in 1810 by the first Napoleon, who has distinguished himself by many wise law reforms. It was imitated by Russia, which protects the copyright twenty-five years after the author's death; by Austria, Denmark, and the German States, who extended this term to thirty years, and by Spain, fifty years; but all these only to native authors.

MANUFACTURING NEWS.

A NEW PAPER MILL AT SALMON FALLS.

The new dam which is soon to be built at Salmon Falls, near the location of the old feeder dam between Westfield and Russell, will bring into use a water-power which, though one of the best in the State, has for a long time lain wholly idle, and has never been utilized to any extent. Like the Furnace Fall's property, this has for many years been owned by a large number of different persons, portions of it belonging to the estates of men long since dead, and other portions being held individually by those now living. A short time ago Messrs. C. A. Jessup and G. L. Laflin of Westfield, desiring to secure the surplus business of paper-making which the firm of Jessup & Laflin, owing to limited capacity, were compelled to reject, determined to build a new mill, and, after much turning over of old papers and search for old owners, finally succeeded in purchasing the full mill privilege of Salmon Falls. In order to increase the capacity of this privilege, they propose to erect immediately either a stone or a wooden dam, 315 feet in length, and 16 feet high, and they will then have a stream of water with 50 feet fall and equal, in the driest season, to 400 horse-power. Of this, however, only 200 horse-powers will be required to run the new mill which they propose to erect during the coming season, and the water then passing through the tail race can furnish the same power to any mill which may be built immediately below, so that there will always be a reserve of 200 horse-power. The mill when completed will be of three tons' capacity and will be used for making fine writing-paper. It will be built of brick, will contain four 500-pound beating engines, two 660-pound washing engines, and two 62-inch Foudrinier machines, will furnish work for 80 or 100 employés, and will be in operation by the 1st of January, 1873. In addition to the valuable water-power the property furnishes also an abundance of spring water (a single spring supplying 300 gallons per minute, under 160 foot head); contains a clay bed from which bricks of the mill can be made, and supplies the necessary stone for the dam, which is to be constructed on the side of the river. The cost of a stone dam will be about $18,000, and of a wooden one $6,000. Jessup & Laflin also expect very soon to obtain the full right to the waters of Russell pond, which is 2400 feet long, 800 wide, and has an average depth of 12 feet. By building an eight foot bulkhead at its outlet, they will be able to obtain all the water that they can possibly need, even if the season is unusually dry. The plan of a joint stock company to carry on this and other works has been proposed, but is not yet fully determined on.—*Springfield Republican.*

The Erie Paper Company's buildings are nearly ready for occupancy and use. They are 40 by 140 feet, with a wing 40 by 100. Their plan of making best qualities, as well as the more common grades of paper, from wood—swamp elm being given the preference—promises good results. Should it succeed as well as is anticipated, another mill will be erected immediately, within a short distance of the city, of sufficient capacity to turn out from the two about ten tons of paper per day.—*American Manufacturer and Trade of the West.*

Hanson & Co. are pushing the work on their new lumber-mill as fast as the weather will permit, the piles being all driven for the foundation. This is to be one of the largest lumber-mills in western Massachusetts, and over $1,000,000 will be invested in the business. The water commissioners have already held two meetings, and will push ahead as fast as possible, and it is confidently expected that Holyoke will be supplied with pure water before 1873.

ESPARTO.

Complaint is made in England that the supply of esparto in the lands nearest the coast of Africa and Spain is being exhausted, through bad management, and that the area of growth must be extended or only an inferior article can be obtained. This will increase the cost of production, and makes it necessary to obtain some new fibre in its place. During 1871 the importation of esparto to Great Britain was as follows: From Spain 65,500 tons; from Oran and Arzew 47,000 tons; and from Tunis and Tripoli, and elsewhere, 28,000 tons, making a total of 140,500 tons.

PAPER-MAKING IN BELGIUM.

From the statistics of the English import of paper from the continent, for the month of January, during the past three years, it appears that in that period the amount received from Belgium has doubled in quantity and more than doubled in value. In January, 1870, importation was 5,774 cwt., while for the same month of the present year it was 10,274 cwt. of printing or writing paper alone. The supply of other kinds of paper excepting hangings has also increased from a value of £1,498 in 1870 to £5,887 in 1872. This shows how the trade in paper from Belgium has increased.

A fire broke out at Chatham Village, N. Y., May 16th, in the paper mill of C. F. Davis, and consumed the mill, together with a large quantity of paper and straw. It rapidly extended to the adjoining buildings, and destroyed five dwellings, as well as the railroad bridge. The loss is estimated at $35,000; insured for about $8,000. The origin of the fire is unknown. The mill has two 250-pound engines, one 48-inch cylinder machine, run by water-power, gives employment to 16 hands, in making straw wrapping-paper. There are ten other paper makers in the place, and one mill. Smith & Co.'s was burnt down in 1869.

In Pearl street, New York, there is a house which makes from paper such articles as milk-pans, cups, bread-pans, wash-bowls, etc., which are said to be superior to wood or metal. The paper, after being pulped, is pressed into the shape, dried, enamelled, and subjected to a heat that would destroy some utensils of the kind. The material is light and easily handled, and does not rust, shrink, leak or easily break.

The *American Artisan* says: As an article for manufacture, the fibre of milk-weed thus far has proved worthless. It is too weak for cloth, and too smooth and glassy to be readily made into paper. For this latter purpose, the fibre of the "cat-tail" flag will serve a better purpose, but it is doubtful if it can be obtained in sufficient quantities to render its utilization profitable.

The large paper-mill of Messrs. Hodgeman & Fuller, at Fort Edward, New York, was totally destroyed by fire on the 9th of May. Loss $75,000. Insured for $28,000. The mill was turning out a large product of straw news, which came mostly to this market, Messrs. Goodwin, Cobb & Co. being the New York Agents. Mr. Hodgeman is also a member of the last mentioned firm.

The city government of Bangor, Me. agreed to exempt all new manufacturing enterprises from taxation, and had also offered to sell the old burying-ground lot as a site for a manufactory. About $3000 has been subscribed toward a guarantee fund for paying the rent of buildings to be used for manufacturing purposes.

The Springfield, Mass., *Republican* says: "The Lyman Mills, at Holyoke, have contracted with Wiggins & Flagg of Holyoke to build their new mill during the coming season, for $70,000. It will contain 1,600,000 brick. Work has already commenced, and will be pushed forward as fast as the weather will permit. This corporation cleared $350,000 last year."

The Oshkosh *Northwestern* says: "Oshkosh, Wis. is growing rapidly, and reports contracts for over one hundred thousand dollars have already been made for buildings in process of erection and to be built the coming season, to say nothing of mills rebuilt and newly erected. This is of course not all that will be built this season; for there are many plans which have not yet matured."

We learn from good authority that a company of New York gentlemen have formed an association, with ample capital, for the manufacture of paper from the fibre of rice grass. Ample experiments have been made to show the adaptability of this material for paper making, and the gentlemen interested in the scheme, who are well-known metropolitan capitalists, are confident of success. Their works are to be erected in Canada, and we hope in a short time to give full particulars of their plans and labors.

The large paper mill on the Oswanpink Creek, in Trenton, was destroyed by fire on May 8th. The loss is not less than $20,000. The stock, owned by Mr. B. B. Bingham, was insured as follows: North British, $3,000; People's of Trenton, $2,000. On machinery owned by the same, $5,000 in the Reliance Insurance Company, $5,000 in the North British; upon the building, which was owned by Mr. Henry McCall, of Philadelphia, there was insurance for $7,000 in the Franklin Insurance Company.

We learn that this fire was not as serious as at first reported. It burned the roof off the part used for storing stock, but the Engines and Machinery were not injured, and the mill is now running as usual.

PAPER CLOTHING.

In civilized countries the manufacturing of paper into various articles of clothing has only been the business of a very brief period, but among barbarous people it is an industry that has been cultivated for years. With us, the employment [illegible] has taken us many years to master the difficulties attending its introduction. At first, our manufacturers confined their productions almost entirely to collars, cuffs and similar minor articles. Prejudice has, in great measure been overcome, our inventors extended their area of production to many fabrics of universal use, but requiring greater strength and pliability than those worn about the neck and arms. The garments made by this process failed to answer the requirements of our day, and were not received with general favor.

At this juncture of affairs, it remains for an English inventor to solve the difficulty, and give us a really serviceable paper fabric. It is a mixture of various animal and vegetable substances, the former being wool, silk and skins; the latter, flax, jute, hemp and cotton. These articles are all reduced to a fine pulp, bleached, and then felted by means of machinery. The mixture of these several substances produces a fabric of wonderful flexibility and strength. It can be sewed together with a machine as woven fabrics, and makes as strong a seam.

This paper is of a very serviceable nature, and is made into table-cloths, napkins, handkerchiefs, pants, curtains, shirts, and other articles of dress. The petticoats made from this felted paper are of very elaborate design and wonderful beauty. They are either printed or stamped, and bear so close a resemblance to linen or cotton goods of like description as to almost defy the scrutiny of the ablest experts. The stamped open-work skirts display a delicacy of pattern that it would be almost impossible to imitate by any ordinary skill with the needle. Imitation blankets and chints for beds, furniture, or curtains, are also made very cheaply. Embossed table-cloths and figured napkins made of felted paper so closely resemble the genuine damask linen as to be palmed off upon the unsuspecting as the genuine article.

In Germany paper napkins have been used for several years. Their cost is but a trifle, and they pay for themselves before they require to be cast aside.

Felted paper is capable of being made into lace, fringe and trimming; and for these several purposes it is unequaled in point of cheapness and durability. Imitation leather is also made from the same material, which is perfectly impervious to water. It is soft and pliable, and is a useful fabric for covering furniture, making into shoes, for belts, and many other purposes.

In China and Japan paper clothing has long been worn by the inhabitants. It is very cheaply produced there, a good paper coat costing only ten cents, while the expense of an entire suit is limited to twenty-five cents.—*United States Economist.*

Springfield, Ohio, is to have a straw-board manufactory added to its business, and there is a strong probability of her being favored with the Holly water works.

The capacity of the Folsom Paper Company at Holyoke has been increased to two tons of manilla-paper daily by its new superintendent, Mr. Hollister.

H. C. Carson has changed his fork factory into a paper mill, and will soon begin the manufacture of manilla paper, at Hinsdale, Mass.

May & Rogers have finished, and are now running their new paper-mill at Ayer, Mass., erected on the site of the one burned last August.

The Springfield *Republican* says: "The Seymour Paper Company have 175 hands making 5½ tons of paper daily at their Windsor Locks mills, Ct., and pay them $35.00 per month. They gather rags from as far distant countries as Egypt.

Troy, New York, is the "third centre" for the manufacture of paper and linen collars and cuffs. Nearly 50,000,000 of these very necessary articles are turned out annually, and 17,000 people are employed in their manufacture.

Paper is now chewing legally into use for water-pails, pans, pots, and cooking utensils generally. It is found, when properly prepared, preferable for these purposes.

A scheme is afloat, amongst very influential Swedish proprietors, including Prince Oscar, to utilize the larch forests of the country in a new fashion by manufacturing paper out of timber. Improved machinery for the purpose has lately been procured in England.—*Journal of Applied Science.*

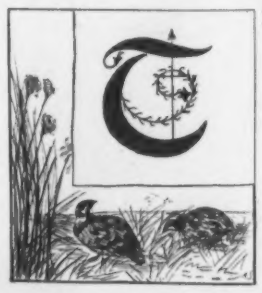
Lucius W. Pond of Worcester has shipped the heaviest iron turning lathe ever made in that city. It weighs thirty-five tons, and valued at $9000, and has been purchased by the Holyoke Machine Company, Holyoke, and will be used for making paper machinery and water-wheels.

The paper mill located at Union Deposit, Pa., was totally destroyed by fire on the evening of May 21st. Mr. W. S. Coffman, who rented the mill on manilla paper, is adding a loss from Mr. J. H. Sherwin, the owner of the property. Insured for $16,000. It will not be rebuilt.

THE PAPER TRADE JOURNAL.

ITS BEGINNING A QUARTER OF A CENTURY AGO.

The First Number and Its Contents—The Lines of Conduct Marked Out for the Publication—Prices of Rags at That Time—The First Advertisers—The Various Offices of the Paper—Its Growth and Accomplishments.



THE first number of THE PAPER TRADE JOURNAL appeared on May 27, 1872, being issued from 14 Park place. The paper consisted of four pages, each sheet being 18¼ inches by 23¼ inches, each page containing seven columns. It began life as a semi-monthly, being issued on the 1st and 15th of each month.

The first page was devoted to the most important news, and the first article on that page was one on that old-time, but yet unsettled, question of "The Tariff on Paper, Books, Etc.," showing that in those days they had their troubles. Another article was entitled "The Sanitary Authorities and the Importation of Rags," and that subject has furnished the topic for very many articles since that time. "Anglo-American Copyright" is the title of another article on a subject which was not settled at that time, and which has not yet passed altogether into oblivion. Then came a column telling of new corporations, followed by a budget of manufacturing news.

The second page was devoted, in part, to editorial matter, including a prospectus and an article on the need of a paper trade journal. The prospectus is so characteristic of Howard Lockwood, who founded THE JOURNAL, that it is herewith printed entire. It is as follows:

PROSPECTUS.

In introducing the first number of THE PAPER TRADE JOURNAL to the public we wish to call attention, first, to the need of a high-toned and superior journal to represent the American paper interest, and, secondly, to the mode in which we propose to carry on this periodical.

In all kinds of industry, owing to increased competition and other causes, it is becoming necessary to carry on business with greater exactness and care. Hence the periodical that will furnish full, trustworthy information in relation to any given interest cannot fail to benefit all those connected with that interest. Knowledge is power, and all the information relating to the paper manufacture and trade which can be presented will add to the knowledge of each subscriber and reader of such a journal and so increase his capacity for conducting his business successfully.

As an organ of the latest ideas, discoveries and opinions of the trade, it will also become so representative in character as to prove indispensable to every paper dealer or manufacturer who wishes to know what others are doing in the occupations in which he is concerned.

Such a periodical should have the following features, which will be found in the present JOURNAL:

First, it should belong to and be conducted by persons who are in no way pecuniarily connected with the trade, so that its independence and freedom from personal bias or interest may be assured.

Second, its manager should have a good knowledge of the paper business, and of the wants of those in the trade. The proprietor of this journal having lately left the paper trade, in which he has had large experience, to become engaged in the publishing business, these two important conditions are hence fulfilled by him to the letter.

Third, such a journal should be issued at least twice a month, and even oftener if possible, in order to give frequent and fresh news of all kinds.

Fourth, it should contain, together with articles on matters of interest to the trade, a careful review of the state of the market in the different grades of paper, paper stock, chemicals, coloring materials and all kinds of supplies, with reliable quotations of the same from unquestionable sources.

Such are the features which we believe should belong to a good trade paper. Whether the present journal fulfills these conditions must be left to our readers to decide, but we can at least claim that having raised so high an ideal we are more likely to deserve support than if we had started with a lower standard of excellency.

The principles enunciated in the prospectus have been the guiding stars of THE JOURNAL in its twenty-five years of work, and the position which it holds in the trade demonstrates beyond question the firm foundation upon which it was based and the fidelity with which those principles have been followed through all these years.

Upon the second page there was a full line of market quotations, and a stock man smacks his lips as he looks over the figures ruling then. As an indication of the prices then in force, it may be stated that fine No. 1 white shirt cuttings were quoted at 10½ to 11 cents; city whites, at 7¾ to 8 cents; No. 2 whites, 5¼ to 6 cents; city seconds, 2¾ to 3½ cents; manilla rope, 5¼ to 5½ cents; gunny bagging, 3¾ to 4 cents; jute butts, 3¼ to 3½ cents; all paper white collar cuttings, 8¼ to 8½ cents; No. 1 white ordinary shavings, 7½ to 7¾ cents; No. 1 soft white shavings, 7¼ to 7½ cents; best folded sheets, No. 1 imperfections, 6 to 6¼ cents; No. 1 book stock, 4¾ to 5 cents; commons, 1 to 1½ cents.

In English rags, cotton cuttings were quoted at 9¼ to 10 cents; out shots, 5¼ to 6¼ cents; seconds, 5 to 5¼ cents; checks and blues, 4½ to 5½ cents; light fustians, 4¾ to 5 cents; dark fustians, 3½ to 3¾ cents; No. 1 gunny, 3⅝ to 3⅞ cents; manilla rope, 5¼ to 5½ cents.

On Hamburg rags the quotations were: SPFFFs, 8¾ to 8¼ cents; SPFFs, 7 to 7½ cents; SPFs, 6 cents; extra fine blue linens, light colors, 6 to 6½ cents; CSPFFFs, 7¾ to 8 cents; CSPFFs, 6 to 6¼ cents; CSPFs, 4½ to 4¾ cents; extra fine blue cottons, light colors, 5½ to 6 cents.

Leghorn rags were quoted at 7¾ to 8½ cents for PPs, 6½ to 6¾ cents for SSs, 4½ to 5 cents for RRs, 7½ to 7¾ cents for Ps, 5¼ to 5 cents for Ss, 4 to 4½ cents for Ts.

Upon the third page was a directory, which is yet one of the features of the paper; a synopsis of recent patents granted to workers in the paper industry, importations of paper, paper stock and paper makers' supplies, and a medley of general news.

The fourth page was almost wholly devoted to advertisements. Among the advertisers in this first number were: Taylor & Darrow, both members of which firm are now dead; R. B. Briggs & Co., the senior member of which is now engaged in the cattle business in the West; Perkins & Goodwin, the style of which house is now Perkins, Goodwin & Co., the junior member of the then firm having joined the majority, while the senior, who was recently the president of the American Paper Manufacturers' Association, now the American Paper and Pulp Association, is yet the active head of the business. Brautigam & Watson, successors to White, Sheffield & Co., had a prominent place on the page. Of this firm, George Watson, Sr., has gone to his long rest, while J. C. Brautigam is engaged in another line of business. H. C. Hulbert & Co. also had a prominent place. This house is doing business now under the old firm style, with H. C. Hulbert yet at the head of the house, and has added to its laurels as the years have rolled by. Goodwin, Cobb & Co., as well as some of the advertisers in that first issue, have gone out of business as firms, although individual members are yet identified with the trade. E. R. & T. W. Sheridan, now T. W. & C. B. Sheridan, had an illustrated advertisement showing their patent sliding knife paper cutter, while the Daniels Machine Company, of Woodstock, Vt., of which Reuben Daniels was proprietor, illustrated and described, in the largest announcement on the page, "the only self-feeding paper-stock cutter manufactured in this country." Another machinery advertisement was that of Taylor & Brightman, Cleveland, Ohio, who manufactured a patent corrugated engine roll and bedplate, and yet another was the Holyoke Machine Company, manufacturer of the "American" turbine water wheel and a line of paper-mill machinery. This company is a leader in the ranks, and, like H. C. Hulbert & Co., another advertiser in the initial number, continues to make its announcements through the columns of THE JOURNAL.

Besides these there were display announcements by James F. Porter, 69 Duane street; William Kelley & Sons, 66 Sheriff street; Hugo Fett & Co., importers of Hamburg rags, 48 New street; Bargh, Warren & Co., paper dealers, 16 South Sixteenth street, Philadelphia, and J. Baird & Co., importers of Italian rags, Philadelphia.

In the directory column referred to were announcements of Brautigam & Watson, then at 63 Beekman street; Bulkley, Dunton & Co., then at 74 John street, and now at 75 Duane street; Goodwin, Cobb & Co., 16 Reade street, and Harris Brothers & Co., 49 John street, both of whom are now out of existence; C. B. Hewitt & Brother, then as now at 48 Beekman street; H. C. Hulbert & Co., then at 13 Beekman street, and now at 53 on the same street; G. W. Millar, then at 10 Spruce street, and now at 62 Duane street; John J. Murphy, then as now at 47 John street; Perkins & Goodwin, then at 84 Duane street, now at 66 on the same street; Platner, Miller & Co., then at 32 Beekman street; M. Plummer & Co., then at 161 William street, and now at 45 Beekman street; James F. Porter, 69 Duane street; J. Q. Preble & Co., 77 White street, now out of business; John Priestly & Co., 33 Beekman street, now out of business; Vernon Brothers & Co., then at 65 Duane street, now at 22 Reade street; and Wilkinson Brothers & Co., 72 Duane street, now at 419 Broome street. These firms' cards all appeared under the head of "Paper and Paper Makers' Supplies."

The straw-wrapping trade was represented by Cornell & Cave, then at 172 Fulton street; Hedges & Morse, then at 180 Fulton street, and D. D. Tomkins, who was in Barclay street, while among the paper makers in the directory were Ira Beebe & Co., 27 Beekman street, N. S. Briggs, 41 Barclay street, John T. Hoag, 27 Chatham street, and H. A. Philp & Co., 109 Reade street. The paper-stock men were represented by R. B. Briggs & Co., C. H. Buckley, Hugo Fett & Co., William Kelley & Sons, Owen Keenan & Co., P. Kildea, Charles P. Spaulding, John C. Stockwell and E. W. Taylor & Co. Allen Brothers, Sandy Hill, were the sole representatives of the hanging paper interests. Bradner Smith & Co., the Claremont Manufacturing Company, the Cleveland Paper Company, Davis & Moore, McIlwaine & Co., the Rockland Company, and the Stewart Paper Company all had cards, while in manilla paper there were Dillingham & Co., C. H. Dexter & Son, Haumen & Fales, Howland & Miller, George S. Sheldon & Co., and Oliver Woodworth. The paper makers who were represented were Morrison, Bare & Co., the Star Paper Company, George Robertson & Son and John Robertson.

The second number of the paper was issued on June 15, 1872, and both in the quality of its reading matter and the quantity of its advertising was an improvement upon the initial number. Among other things it contained a list of prominent mills which had sent in their subscription and had aided the new enterprise in a variety of ways.

Among the editorials was one under the caption of "This Is an Independent Journal," in which it was stated that "as there seems to be some doubts about the matter among a few of our out-of-town correspondents, we repeat what we said before with proper emphasis in our prospectus, namely, that this journal is independent and free from interest in any clique or single firm in the trade, and that it will not cater to the wants of the metropolitan district alone, but to the interests of the whole trade, and thus be truly representative in character. No newspaper can be of value or deserve support upon any other condition than these, and it is our prime object to maintain the most perfect independence that is possible." The proposition which was enunciated in the first issue and which was reiterated in the second issue has always been and is to-day the guiding principle of THE JOURNAL.

In the first issue of THE JOURNAL it was stated that the retail price was 5 cents. This was an error, which was corrected in the second issue, wherein the price was stated at 10 cents. In issue No. 19, dated March 1, 1873, the paper was enlarged, a column being added to each page, while the pages themselves were also lengthened. On June 15, in order to accommodate the growth of the paper, an eight-column supplement was published, this being the first supplement ever published by THE PAPER TRADE JOURNAL.

The paper prospered. People found in it that which was of value to them, and subscriptions and advertisements both came along in a liberal and encouraging way. There were established in it a stationers' department and a bookmakers' department. These developed to such an extent that the former expanded into *The American Stationer*, a weekly devoted exclusively to the interests of the stationery and fancy goods trade, its first separate issue beginning with No. 20, April 6, 1874, and the latter in 1885 took separate form as *The American Bookmaker*, a monthly publication treating of printing and bookmaking.

In 1873 was published the first edition of Lockwood's Directory of the Paper Trade, which was an outgrowth of and an auxiliary to THE JOURNAL.

From 14 Park place the office of THE JOURNAL was removed to 36 Beekman street, right in the heart of the paper district, but a demand for more room later led to another change, the establishment being removed to 74 Duane street, where it remained until 1883, when it again sought larger quarters and found them at 126 and 128 Duane street, in the building now occupied by William Pickhardt & Kuttroff. In 1895 the quarters there became cramped, and the business was removed to the seven-story building corner of Bleecker street and West Broadway, where it now is.

THE JOURNAL during all these twenty-five years has kept in close touch with the paper trade in all its branches, and its columns contain a pen picture of the movements of the various branches, and of the individuals interested in them, during all that time. It has kept abreast of all the developments of the trade, and in every way has stood for the best thought and deed of the whole paper-making industry. From a four-page semi-monthly it has grown to be a twenty-page weekly, each issue crowded with a chronicle of the doings in the various paper-manufacturing centres and paper markets of the country.

In its technical department it has had the services of able, skillful, educated men, specialists in their lines, who have given to the trade the work of their pens through its columns. Its correspondence is full and complete each week, there being presented a pen picture of the work going on in the various marts.

It has closely followed the inventive genius of the country as shown by the records of the Patent Office, and has been prompt to describe and illustrate the latest inventions of the day.

To descriptions of current events it has always given full space, and a perusal of its columns is simply a reading of a history of the entire trade. Each week it places before its readers exclusive news, displayed in a proper setting.

THE JOURNAL has always stood for anything which benefited the whole trade. Wherever it has observed influences harmful to trade it has opposed them, and wherever shams have appeared it has denounced them. A recent instance of this was in the case of a man who was constantly organizing new companies, each one having the vital part of the name of some prominent concern, and then buying paper from mills all over the country. There were enough gullible sellers to give the rascal a good living, for he paid for none of the goods which he bought in this way. THE JOURNAL investigated the matter, followed up the methods of the fellow, spread them before the trade, and it is hoped saved a number of mills a considerable amount of money. The buyer has not been heard of in some time. From time to time THE JOURNAL has also exposed fraudulent failures, bringing to light the facts for the benefit of all, while it has fallen to its lot on several occasions to assist materially in unearthing customs frauds.

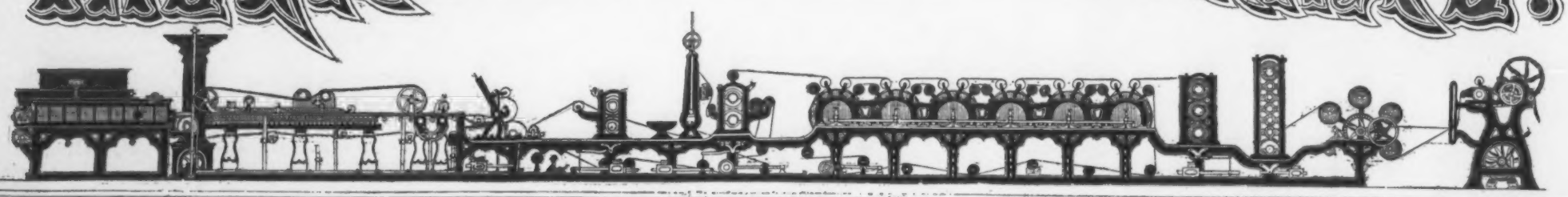
The period of time covered by the publication of THE JOURNAL has been one of revolution, so far as methods of manufacture and so far as the class of raw material are concerned. At the time of the first issue straw was the stock which, next to rags, was most used. Ground wood had been introduced about six years before, and was gaining ground in the favor of the manufacturers, although the total output of it then was very small, as compared with that of to-day. Now straw is not a factor in the making of print paper, while ground wood is the raw material which regulates the price not only of print but of other grades of paper.

Soda fibre twenty-five years ago was in use, but there were only a few manufacturers of it, and it was nowhere as generally used as it is now. Sulphite fibre, while a fact, was not a factor as a raw material in American paper making. Tilghman had discovered it, but had given it up after losing time and money. The idea was then developed across the water, and only a comparatively few years ago this idea, worked out in a practical way, was transferred to the country where it originated. It took strong root, and in the course of only a very short time grew to be a sturdy plant. Although it is only a decade since the starting of the first mill, which made a success of the manufacture financially, the increase in the number of mills and consequently of product has been sufficient to cause over-production and to force down prices, and to compel manufacturers to look for export trade.

When THE JOURNAL came into the world jute butts were of very considerable interest to the trade, and for years afterward large quantities of them were consumed by paper manufacturers. Wood has driven them out of the field, owing to the fact that they cannot compete as to price. Some butts are yet used in the trade, but that stock no longer cuts any serious figure from the manufacturer's point of view.

In the early days rags were, of course, the staple and foundation stock, and there was scarcely a mill in which they were not used. To-day many mills never have rags within their doors, except such as the modern paper manufacturer claims to be wearing, while a very much larger number used only a small percentage of rags. It used to be said by the maker, "I'll guarantee that that sheet is of all rag stock;" now he says "I'll guarantee that that sheet is of all wood stock, without a trace of rag." In the olden days a paper manufacturer was ashamed to acknowledge that he used wood. Now he glories in the fact that he can make a fine sheet of paper entirely of the once despised stock. This shows very effectively the overturning which has taken place in the industry in one line alone.

THE PAPER TRADE JOURNAL.



VOL. I. NEW YORK. MAY 27, 1872. No. 1.

THE TARIFF ON PAPER, BOOKS, TYPE, &c.

The following report of the debates in the House of Representatives on the Tariff will interest all our readers:

[illegible] went into Committee of the Whole, [illegible] on the Tariff and Tax bill.

Sal-soda and Soda-ash.

Mr. Sypher moved to strike out the item taxing sal-soda and soda-ash one quarter cent per pound.

After his discussion, the amendment was rejected.

Books and Paper.

Mr. Hoar moved to add to the item taxing books, &c., twenty and a half cents per pound, an exception of such as are imported by public libraries, colleges, schools, philosophical societies, &c.

Mr. Kerr moved to reduce the rate to ten cents per pound.

Mr. Holman moved to put books on the free list.

Mr. Banks argued in favor of fixing the duty on books at as low a rate as consistent with the interests of American publishers. He thought that a reduction from twenty-five per cent. ad valorem to ten or fifteen per cent. should be made.

Mr. Dawes opposed the proposition to put books on the free list, and referred to the fact that, even under the present tariff, the gentleman from New York—Mr. Cox—had found it to his pecuniary interest to have his late book of travels printed in England, and to pay duty on it here. It was mortifying to him to see an Englishman (alluding to Frank Leslie) assisting beside members and whispering to them. He—the sergeant at the ear of type, that he might have the privilege of going to England and getting his paper printed there. He did not have any sympathy with this effort to hurt an American publishing-house.

Mr. Cox said he had got his book printed in England—not bound—because he found that he could pay the twenty-five per cent. duty, and still have the book twenty-five per cent. cheaper than

Mr. Dawes asked whether Mr. Cox wanted others to have their books published in England.

Mr. Cox said he did not, but he would let the poor author go anywhere he chose to have his book printed. As to the question of competition with cheap labor, he reminded Mr. Dawes that the State of Massachusetts had introduced cheap pagan labor, chop-sticks, pig-tail and all, to compete with their own enlightened Christian labor.

Mr. Banks said that what he wanted to know, and what Mr. Leslie wanted to know, was, what was the lowest rate at which paper might be imported here without detriment to the paper manufacturers of this country. The fact of Mr. Leslie having been born in England was not a material question. He had been engaged on *Gleason's Pictorial* in Boston in 1850, and had since been extending the art of illustration which, if continued, would advance the time when daily journals of the country would be printed with illustrations.

Mr. Dawes regretted his allusion to Mr. Leslie, but he thought it strange that he should want to buy his paper abroad while Harper's and other illustrated newspapers bought their paper here. It was unfortunate that such a condition of things existed that Americans could go abroad and employ the labor of Belgians at fifteen cents a day, with bleaching powder, free of duty, with soda free of duty, and with an export duty on rags. He could not understand how the American sentiment in a man's breast slept under such circumstances.

Mr. Kerr characterized Mr. Dawes' allusion to fifteen cents a day labor as mere stuff. Notwithstanding the cheap labor of Belgium and some of the German States, Great Britain was the book-manufacturing country of Europe. That country made more books and printed more literature and did more for the civilization of the world than all the rest of Europe, and it did so by the aid of free trade.

Mr. Finkelburg remarked, that a person listening to the tariff debate might imagine that all the industries of the country were carried on under the co-operative system, and that all the bounties derived under the tariff legislation went directly into the pockets of the laborers, while in 99 cases out of 100 they went into the pockets of the employers. The laborer was not paid a cent more than the general rate of wages required, no matter how high the protective duty which the employer had the benefit of. The difference of wages in America and in Europe was not a consequence of tariff legislation. It existed before the war, and was due to a variety of circumstances.

Mr. Holman thought it a most humiliating thing that the Government should impose a tax on learning—a tax by the avoirdupois—and reminded Mr. Dawes that the Germans, Swedes, Norwegians and representatives of other nationalities in the country must draw their books from their native countries, and that consequently this tax was especially hard on them. He suggested that at least all school-books should be admitted free of duty.

Mr. Butler, of Massachusetts, referring to the increased prosperity of the American laborer, illustrated it by showing that in one of the large woolen manufactories of Lowell, Mass., with which he was familiar, the relative cost of labor to production was, from fifteen to twenty years ago, twelve and a half per cent., and is now nineteen per cent. He did not claim, however, that the tariff system had produced that improvement. There were other causes at work which were potentially overlooked.

Mr. Townsend, of Pennsylvania, gave other illustrations of the improved condition of American labor.

Mr. Beatty, while admitting that this bill might prove beneficial to the country, argued that the ten per cent. reduction on wool would be injurious to the wool-growing interest, which had been for many years prior to 1865 outraged, swindled, plundered by tariff laws.

[illegible] the committee rose, and the committee proceeded to vote on the pending amendments.

Mr. Holman's amendment making school-books, charts and maps used by common schools, Bibles and Testaments free of duty, was rejected—69 to 72.

Mr. Kerr's amendment to reduce the duty on books from twenty and half cents to ten cents per pound was rejected—75 to 79.

Mr. Hoar's amendment was agreed to, and also one offered by Mr. Garfield, excepting books in foreign languages, and English editions of old works unrevised for twenty years.

Mr. Dawes moved to put the duty on all paper at ninety per cent. of the existing duties, as a substitute for the paragraph taxing sized printing-paper twenty-eight per cent. Agreed to—85 to 78.

The portion of the bill as passed on by the Committee to-day, makes the following provisions:

On printed books and all other printed paper, bound or in sheets, except newspapers, magazines and periodicals, except for public libraries, colleges, schools, philosophical societies, &c., and except books in foreign language or English editions of old books unrevised in twenty years, 15½ cents per pound; on newspapers, magazines and periodicals unbound 6 cents per pound; on all paper, 90 per cent. of existing duties.

SECOND DAY.

WASHINGTON, May 17th.—The House went into Committee of the Whole, Mr. Scofield in the chair, on the Tax and Tariff bill.

Mr. Brooks (Dem., N.Y.) offered an amendment to the item on paper, which was fixed yesterday at 90 per cent. of the existing duties, providing that the duty on printing-paper, whether sized or unsized, shall be equal, and 20 per cent. ad valorem—agreed to by 80 to 56.

Mr. Beck (Dem., Ky.) moved to insert a paragraph authorizing one-half of the customs duty to be paid in legal-tender notes.

Mr. Beck accepted that modification.

Mr. Sargent (Rad., Cal.) offered as a substitute to make the notes of Gold Banks, duly organized under the United States laws, receivable for import duties. Rejected.

Mr. Beck's proposition, making one-third of the duties payable in legal notes, was agreed to—94 to 63.

Mr. Blair (Rad., Md.) moved to make the duty on type, type-metal, and stereotype plates 10 per cent. ad valorem.

Mr. Brooks moved to add to Mr. Blair's amendment the words, "and on lead and other materials that enter into type-casting, 10 per cent. ad valorem." Rejected—87 to 77.

Mr. Blair's amendment was also rejected.

Mr. Harris (Dem., Va.) moved to insert printers' type. Rejected.

Mr. Holman (Dem., Ind.) moved to insert printing paper. Rejected.

Mr. Garfield moved to add to the free list books printed in foreign languages and books in the English language of an edition unrevised in twenty years. Agreed to.

Mr. Sargent moved to insert jute butts. Agreed to.

Motions were made and rejected to put on the free list medicinal books, fire-wood, leather, newspapers, coal, soda, cotton waste, books used in colleges and schools, old white hats and coats, wheat and the Holy Bible.

The committee passed to the sections following the free list.

THE SANITARY AUTHORITIES AND THE IMPORTATION OF RAGS.

Fearing the spread of contagious diseases, about six months since the Board of Health in this city passed a resolution forbidding the landing of rags from vessels at any of our docks and piers, except under such severe restrictions as to shut them out almost entirely, and as the importation of this material for supplying the paper mills is an extensive business interest in this city, there was considerable consternation among importers of rags. By the new law they were allowed to land the rags under certain conditions, but could not store them nor open the bales in the city under any circumstances. After a little time, however, the consignees had their cargoes sent to storehouses along the Brooklyn water front, where they were kept until shipped to the interior, or to other ports, there being no paper mills in this city, consequently no demand for consumption. But the Brooklyn Health authorities took the alarm also, and adopted a similar anti-rag ordinance, and the importers were left no resort but to send their bales of rags by a roundabout route to *New Jersey* for reception and storage, since which time, they claim, their business has fallen off very materially, and it has hardly been profitable to bring rags to this port, importations being sent to Baltimore, Philadelphia, Boston, and other ports where no such sanitary restrictions prevail. The rag men claim that the restrictions on their business are unnecessarily severe, and have presented a petition, with many signatures, to the Board of Health, asking for their removal. Congress has encouraged the importation by placing rags on the free list, and they contend that the danger of infection from rags is not so great as claimed, and that the health laws are too stringent.

At the weekly meeting of the Board of Health on May 16th, the Sanitary Committee recommended that rags be allowed to be landed at this port under the supervision of the Sanitary Committee, the consignees being required to give a written guarantee not to open the bales in this city. The resolution called forth considerable debate. The Health Officer urged its passage, and stated that there was very little danger of infection from rags. This was opposed by Commissioners Manierre and [illegible] and the matter was finally referred to the Committee on Law and Ordinances.

Most of the rags brought from abroad to this country come from Southern Europe, Italy principally, but some from Spain, Austria and Algeria in Africa. Of late Russia has also been contributing largely to our supply of paper stock. The importers generally are willing to pledge themselves not to open the bales in this city, for the reasons above stated, that they are sent direct to the paper mills, none of which are in this vicinity. They hope the Board of Health will grant their petition. One said that he is sure that a single one of the numerous local junkmen and rag-dealers, who, unrestricted, receive the collections of the ragpickers from the dirtiest, vilest and most unwholesome tenement house quarters of the city, does far more toward aiding the dissemination of disease than all the rag importers together. The importers and consignees, to carry on their business at present, are driven to evading the ordinances of the Health Board as to the landing of their rags in the following manner: When a vessel arrives they do not enter their goods at the Custom-house, nor claim them in any way whatever, so that when the ship discharges, the goods after the usual forty-eight hours delay, are sent with all other unclaimed packages to the regular General Order warehouse of the district designated by the Collector of the Port. When the consignee or owner has disposed of his rags, he claims his property at the warehouse, pays the cartage, storage and other charges, and takes them away. But these transfers and charges bring the expenses of the owner and dealer to such a point that, as they allege, the business scarcely pays.

ANGLO-AMERICAN COPYRIGHT.

MEMORIAL OF BRITISH AUTHORS ON COPYRIGHT IN THE UNITED STATES.

The following memorial of British authors on the subject of copyright in the United States of America, was sent to the Right Hon. Earl Granville on Friday, April 19, by Mr. William Gilbert, the honorable Secretary:—

Looking forward with satisfaction to the prospect of harmonious relations being happily established between the United States and the United Kingdom, we, the undersigned, hope for a reconsideration of the policy in virtue of which authors, as authors, enjoy no rights which American citizens are bound to respect. Letters from influential Americans—one of them a leading New York publisher—which have recently appeared here, joined with the approval of them expressed in the journals of the United States, show the desire of the Americans for the conclusion of a Copyright Convention between that country and ours. We understand that the demands of publishers in this country have hitherto been the most formidable obstacles to the negotiations of a Copyright Convention. We are of opinion that the interests of our publishers in American copyrights are quite independent of the just claims of British authors, and that the latter may be fully admitted without recognition of the former. We think it would be a grave error if the settlement of this matter were retarded or rendered impossible, in consequence of two classes of claims, which in essence are wholly distinct, if not antagonistic, being regarded by negotiators representing this country as identical and inseparable. Americans distinguish between the author, as producing the idea, and the publisher, as producing the material vehicle by which the ideas are conveyed to readers. They admit the claim of the British author to be paid by them for his brain work. The claim of the British book manufacturer to a monopoly of their book market they do not admit. To give the British author a copyright is simply to agree that the American publisher shall pay him for work done. To give the British publisher a copyright is to close the American market to him on terms which prevent the American publisher from competing. Without dwelling on the argument of the Americans that such an arrangement would not be free trade, but the negation of free trade, and merely noticing their further argument, that while their protective system raises the prices of all the raw materials, free competition with the British book-manufacturer would be fatal to the American book manufacturer, it is clear that the Americans have strong reasons for refusing to permit the British publisher to share in the copyright which they are willing to grant to the British author. We venture to suggest, therefore, that, responding to the cordial feeling recently expressed by Americans on the subject, and duly appreciating the force of their reasons for making the above distinction, future negotiations should be conducted with a view to secure a copyright on the conditions they specify. Without making it the foundation of a further claim for reciprocity of treatment, we mention the fact that American authors may, if they please, secure all the advantages of copyright in the United Kingdom which are enjoyed by native authors.

Rev. Edward Henry Bickersteth, Sir John Lubbock, Bart., M.P.; Thomas H. Huxley, F.R.S.; Thomas Hughes, M.P.; Rev. Dr. T. Guthrie, Rev. Wm. Arthur, Philip James Bailey, J. E. Hilary Skinner, J. R. Leicester Warren, Rev. Harry Jones, Rev. J. Martineau, Andrew Edgar, L.L.D., W. Durrant Cooper, F.S.A.; Joseph Dalton Hooker, M.D., F.R.S., Harriet Martineau, John Percy, M.D., F.R.S.; George Scharf, F.S.A.; Thomas Blizard Curling, George Augustus Sala, Robert Buchanan, Henry Labouchere, Augustus W. Franks, Vice-President Society of Antiquaries; Richard A. Proctor, Blanchard Jerrold, Herbert Spencer, G. H. Lewis, John Stuart Mill, Henry Taylor, J. A. Froude, Thomas Carlyle, John Ruskin, John Morley, W. T. Rae, C. Kingsley, Elisa Yates, William Black, Edward Dicey, James Caird, William Gilbert, Sheldon Amos, Erwin Pears, James Payne, Archibald Forbes, J. C. Parkinson, W. T. McCullagh Torrens, M.P.; Charles Darwin, Erastus Wilson, Shirley Brooks, Tom Hood, Justin McCarthy, John Tyndall, F.R.S.

A reply to the above memorial has been received as follows:

FOREIGN OFFICE, May 2, 1872.

SIR.—I am directed by Earl Granville to acknowledge the receipt of your letter of the 19th ult., inclosing a memorial of British authors on the subject of copyright in the United States, and His Lordship desires me to state to you that the subject will receive the careful attention of Her Majesty's government.

I am your obedient servant,

WILLIAM GILBERT, Esq. ENFIELD.

INCORPORATIONS.

RAMSBOTTOM PAPER MILL.

This company proposes to acquire letters patent, for producing paper pulp from wood, granted 13th July, 1870, to David Adam Fyfe, and to purchase a mill at Ramsbottom, Lancashire. It was registered 25th inst., with a capital of £60,000, in £10 shares, and the following are the first subscribers:—

	SHARES.
*Thomas Hutchison, 3, Clarence-street, Manchester, merchant	100
*Ernest Delfils, 3, Parsonage, Blackfriars, Manchester, merchant	100
*William Ramsay, 44, George's-street, Manchester, calico printer	500
*Ferguson Mason, Newton Paper Mills, Newton-le-Willows, Lancashire	100
David Adam Fyfe, 100, Brunswick-street, Oxford-road, Manchester, paper maker	100
Parr Mason, jun., 24, St. Ann's place, Manchester, engineer	200
Lawrence Hall, 53, Mosley-street, Manchester, manufacturer	100

Those marked with an asterisk are to be the directors, with the addition of James Park, engineer, Fernhill-foundry, Bury, and Edward Partington, Bury, Lancashire. Qualification, 100 shares.

COLONIAL AND FOREIGN FIBRE CO.

This company was registered 25th ult., with a capital of £100,000, in shares of £5, to acquire letters patent for the treatment of fibre-bearing plants and machinery applicable to England and New Zealand. The first subscribers are:—

	SHARES.
*Geo. Jno. Luckie, Spring-hill, Sydenham, Kent, merchant	500
*Henry W. Petre, Chelmsford, Essex	270
*George Timlins, 17, Princes Square, Bayswater, gentleman	1,200
*Edward Kynaston, 24, Mincing-lane, E. C., colonial broker	1,000
*Charles Nichols, 121, Bishopsgate-street, E. C., merchant	250
*John Clarke, The Dingle, Sydenham-hill, Kent, Major-General	100
Thomas Nichols, 121, Bishopsgate-street, E. C., merchant	250
*J. B. Minlees, 45 Scotland-street, Glasgow, engineer	2,000

Each director must hold at least 100 shares in the company.

The first directors are those whose names are marked with an asterisk, and are to be not less than five nor more than seven. Remuneration, £700 per annum.

BROOK MILLS WOOD PULP CO.

This company proposes to acquire the Brook Paper Mills at Little Easton, Derby, from Messrs. Tempest and Harvey, and to carry on same for the manufacture of paper and cardboard from wood pulp. The company was registered 2d inst., with a capital of £50,000, in 400 shares of £50 each, the following being the first subscribers:

	SHARES.
Roger Dutton Mills, Keyham, Leicester, land agent	20
George Alfred Robinson, Belgrave, Leicester, gas engineer	10
Charles Angrave, Belgrave, Leicester, manufacturer	20
G. H. Wade, Belgrave, Leicester, wine merchant	20
Charles S. Robinson, Leicester, gas engineer	10
Alfred B. Simpson, Renovath, near Derby, solicitor	40
Alfred Robinson, Belgrave, Leicester, gas engineer	60

Directors to be not less than 3 nor more than 7. Qualification, 10 shares. Subscribers to appoint first directors, and act *ad interim*.

LONDON PAPER STOCK CO.

This company proposes dealing in all materials for making paper, and was registered 4th inst., with a capital of £10,000, in shares of £5 each. The following are the first subscribers: *James Goodwin, Liverpool, merchant; S. E. Darrock, Oakholme, Wimbledon; J. H. Highmore, Everton, clerk; *John Jowett, Hill House, Hington, Lancaster, broker; A. Bland, Egremont, Chester cashier; S. M. Gladwin, Liverpool, merchant; G. H. Sharp, Liverpool, salesman. Directors to be not less than 3 nor more than 10. First directors to be those whose names are marked with an asterisk and Amos H. Cobb, New York, merchant. General meeting to determine remuneration. Mr. Goodwin is appointed managing director, and Mr. S. E. Darrock as manager of the company.

The Akron Straw Board Company has been incorporated for the purpose of manufacturing straw board, straw paper, printing, writing and wrapping paper at Akron, Summit County, Ohio. Capital stock $150,000. Corporators, O. C. Barber, Jacob H. Wise, Lewis Miller, John R. Buchtel and David L. Rhodes.

The Calcutta Jute Mills have been registered in England, with a capital of £100,000, in shares of £20 each, to acquire the Ishere Jute Mills in Bengal, and to carry on the manufacture and sale of jute there.

During the month of March six new printing and publishing companies were incorporated in London.

THE LAW OF COPYRIGHT.

The American law protects copyright for twenty-eight years, with the privilege of extension to the surviving family for fourteen years more, but exclusively to Americans. There is a movement now on foot to extend the same privileges to foreigners; but it is not agreed as yet if it will be granted to the authors alone or also to the foreign publishers; we hope the authors alone will obtain the privilege. In England the law protects copyright forty-two years from the date of publication; in Sweden for only twenty years; but it falls to the State if the author or publisher neglects to keep the books continually for sale; in France it is protected during the whole lifetime of the author, and twenty years after his death for the benefit of his heirs—no distinction being made between native or foreign authors. This law was enacted in 1810 by the first Napoleon, who has distinguished himself by many wise law reforms. It was imitated by Russia, which protects the copyright twenty-five years after the author's death; by Austria, Denmark, and the German States, who extended this term to thirty years, and by Spain, fifty years; but all these only to native authors.

MANUFACTURING NEWS.

A NEW PAPER MILL AT SALMON FALLS.

The new dam which is soon to be built at Salmon Falls, near the location of the old feeder dam between Westfield and Russell, will bring into use a water-power which, though one of the best in the State, has for a long time lain wholly idle, and has never been utilized to any extent. Like the Turner's Fall's property, this has for many years been owned by a large number of different persons, portions of it belonging to the estates of men long since dead, and other portions being held individually by those now living. A short time ago Messrs. C. A. Jessup and G. L. Laflin of Westfield, desiring to secure the surplus business of paper-making which the firm of Jessup & Laflin, owing to limited capacity, were compelled to reject, determined to build a new mill, and, after much turning over of old papers and search for old owners, finally succeeded in purchasing the full mill privilege of Salmon Falls. In order to increase the capacity of this privilege, they propose to erect immediately either a stone or a wooden dam, 315 feet in length, and 16 feet high, and they will then have a stream of water with 30 feet fall and equal, in the driest season, to 400 horse-power. Of this, however, only 200 horse-powers will be required to run the new mill which they propose to erect during the coming season, and the water then passing through the tail race can furnish the same power to any mill which may be built immediately below, so that there will always be a reserve of 200 horse-power. The mill when completed will be of three tons' capacity and will be used for making fine writing-paper. It will be built of brick, will contain four 500-pound beating engines, two 600-pound washing engines, and two 62-inch Fourdrinier machines, will furnish work for 90 or 100 employés, and will be in operation by the 1st of January, 1873. In addition to the valuable water-power the property furnishes also an abundance of spring water (a single spring supplying 300 gallons per minute, under 160 foot head); contains a clay bed from which bricks of the mill can be made, and supplies the necessary stone for the dam, almost [illegible] material. The cost of a stone dam will be about $18,000, and of a wooden one $6,000. Jessup & Laflin also expect very soon to obtain the full right to the waters of Russell pond, which is 2400 feet long, 800 wide, and has an average depth of 12 feet. By building an eight foot bulkhead at its outlet, they will be able to obtain all the water that they can possibly need, even if the season is unusually dry. The plan of a joint stock company to carry on this and other works has been proposed, but is not yet fully determined on.—*Springfield Republican.*

The Erie Paper Company's buildings are nearly ready for occupancy and use. They are 40 by 140 feet, with a wing 40 by 100. Their plan of making best qualities, as well as the more common grades of paper, from wood—swamp elm being given the preference—promises good results. Should it succeed as well as is anticipated, another mill will be erected immediately, within a short distance of the city, of sufficient capacity to turn out from the two about ten tons of paper per day.—*American Manufacturer and Trade of the West.*

Hanson & Co. are pushing the work on their new lumber-mill as fast as the weather will permit; the piles being all driven for the foundation. This is to be one of the largest lumber-mills in western Massachusetts, and over $1,000,000 will be invested in the business. The water commissioners have already held two meetings, and will push ahead as fast as possible, and it is confidently expected that Holyoke will be supplied with pure water before 1873.

ESPARTO.

Complaint is made in England that the supply of esparto in the lands nearest the coast of Africa and Spain is being exhausted, though bad management, and that the area of growth must be extended or only an inferior article can be obtained. This will include a great deal of prohibitive, and makes it necessary to obtain some new fibre in its place. During 1871, the importation of esparto to Great Britain was as follows: From Spain 65,500 tons; from Oran and Arzew 47,000 tons; and from Tunis and Tripoli, and elsewhere, 28,000 tons, making a total of 140,500 tons.

PAPER MAKING IN BELGIUM.

From the statistics of the English import of paper from the continent, for the month of January, during the past three years, it appears that in that period the amount received from Belgium has doubled in quantity and more than doubled in value. In January, 1870, importation was 5,774 cwt., while for the same month of the present year it was 10,274 cwt. of printing or writing paper alone. The supply of other kinds of paper excepting hangings has also increased from a value of £1,498 in 1870 to £8,887 in 1872. This shows how the trade in paper from Belgium has increased.

A fire broke out at Chatham Village, N. Y., May 10th, in the paper mill of C. F. Davis, and consumed the mill, together with a large quantity of paper and straw. It rapidly extended to the adjoining buildings, and destroyed five dwellings, as well as the railroad bridge. The loss is estimated at $25,000; insured for about $9,000. The origin of the fire is unknown. The mill has two 230-pound engines, one 48-inch cylinder machine, run by water-power, gives employment to 16 hands, in making straw wrapping-paper. There are ten other paper makers in the place, and one mill. Smith & Co.'s was burnt down in 1860.

In Pearl street, New York, there is a house which makes from paper such articles as milk-pans, cups, bread-pans, wash-bowls, etc., which are said to be superior to wood or metal. The paper, after being pulped, is pressed into the shape, dried, enamelled, and subjected to a heat that would destroy some utensils of the kind. The material is light and easily handled, and does not rust, shrink, leak or easily break.

The *American Artisan* says: As an article for manufacture, the fibre of milk-weed thus far has proved worthless. It is too weak for cloth, and too smooth and glassy to be readily made into paper. For this latter purpose, the fibre of the "cat-tail" flag will serve a better purpose, but it is doubtful if it can be obtained in sufficient quantities to render its utilization profitable.

The large paper-mill of Messrs. Hodgeman & Palfrey, at Port Edward, New York, was totally destroyed by fire on the 9th of May. Loss $75,000. Insured for $30,000. The mill was turning out a large product of straw paper, which came mostly to this market. Messrs. Goodwin, Colt & Co. being the New York Agents. Mr. Hodgeman is also a member of this last mentioned firm.

The city government of Bangor, Me. agreed to exempt all new manufacturing enterprises from taxation, and had also offered to sell the old burying-ground lot as a site for a manufactory. About $3000 has been subscribed toward a guarantee fund for paying the rent of buildings to be used for manufacturing purposes.

The Springfield, Mass., *Republican* says: "The Lyman Mills, at Holyoke, have contracted with Wiggins & Flagg of Holyoke to build their new mill during the coming season, for $70,000. It will contain 1,600,000 brick. Work has already commenced, and will be pushed forward as fast as the weather will permit. This corporation cleared $350,000 last year."

The Oshkosh *Northwestern* says: "Oshkosh, Wis. is growing rapidly, and reports contracts for over one hundred thousand dollars have already been made for buildings in process of erection and to be built the coming season, to say nothing of mills rebuilt and newly erected. This is of course not all that will be built this season; for there are many plans which have not yet matured."

We learn from good authority that a company of New York gentlemen have formed an association, with ample capital, for the manufacture of paper from the fibre of rice grass. Ample experiments have been made to show the adaptability of this material for paper making, and the gentlemen interested in the scheme, who are well-known metropolitan capitalists, are confident of success. Their works are to be erected in Canada, and we hope in a short time to give full particulars of their plans and labors.

The large paper mill on the Oswanpink Creek, in Trenton, was destroyed by fire on May 8th. The loss is not less than $30,000. The stock, owned by Mr. E. B. Bingham, was insured as follows: North British, $3,000; People's of Trenton, $3,000. On machinery owned by the same, $5,000 in the Reliance Insurance Company, $5,000 in the North British; upon the building, which was owned by Mr. Henry McCall, of Philadelphia, there was insurance for $7,000 in the Franklin Insurance Company.

We learn that this fire was not as serious as at first reported. It burned for and off the part used for binding stock, but the Engines and Machinery were not injured, and the mill is now [illegible] at work.

PAPER CLOTHING.

In civilized countries th[illegible] manufacturing of paper into various articles [illegible] clothing has only been the business of a ver[illegible] brief period, but among barbarous people it [illegible] an industry that has been cultivated for years. With us, the supply has taken us many years [illegible] to master the difficulties attending its introd[illegible]. At first, our manufacturers confined t[illegible] entirely to collars, cuffs and minor articles. Prejudice has [illegible] been overcome, our inventors extended their area of production to many fabrics of universal use, but requiring greater strength and pliability than those worn about the neck and arms. The garments made by this process failed to answer the requirements of our day, and were not received with general favor.

At this juncture of affairs, it remains for an English inventor to solve the difficulty, and give us a really serviceable paper fabric. It is a mixture of various animal and vegetable substances, the former being wool, silk and skins; the latter, flax, jute, hemp and cotton. These articles are all reduced to a fine pulp, bleached, and then felted by means of machinery. The mixture of these several substances produces a fabric of wonderful flexibility and strength. It can be sewed together with a machine to woven fabrics, and makes as strong a seam.

This paper is of a very serviceable nature, and is made into table-cloths, napkins, handkerchiefs, pants, curtains, shirts, and other articles of dress. The petticoats made from this felted paper are of very elaborate design and wonderful beauty. They are either printed or stamped, and bear so close a resemblance to linen or cotton goods of like description as to almost defy the scrutiny of the oldest experts. The stamped open-work skirts display a delicacy of pattern that it would be almost impossible to imitate by any ordinary skill with the needle. Imitation blankets and chints for beds, furniture, or curtains, are also made very cheaply. Embossed table-cloths and figured napkins made of felted paper so closely resemble the genuine damask linen as to be palmed off upon the unsuspecting as the genuine article.

In Germany paper napkins have been used for several years. Their cost is but a trifle, and they pay for themselves before they require to be cast aside.

Felted paper is capable of being made into lace, fringe and trimming; and for these several purposes it is unequaled in point of cheapness and durability. Imitation leather is also made from the same material, which is perfectly impervious to water. It is soft and pliable, and is a useful fabric for covering furniture, making into shoes, for belts, and many other purposes.

In China and Japan paper clothing has long been worn by the inhabitants. It is very cheaply produced there, a good paper coat costing only ten cents, while the expense of an entire suit is limited to twenty-five cents.—*United States Economist.*

Springfield, Ohio, is to have a straw-board manufactory added to its business, and there is a strong probability of his being favored with the Holly water works.

The capacity of the Falcon Paper Company at Holyoke has been increased to two tons of manila paper daily by its new superintendent, Mr. Hollister.

H. C. Carson has changed his fork factory into a paper mill, and will soon begin the manufacture of manilla paper, at Hinsdale, Mass.

May & Rogers have finished, and are now running their new paper-mill at Ayer, Mass., erected on the site of the one burned last August.

The Springfield *Republican* says: "The Seymour Paper Company have 175 hands making 5½ tons of paper daily at their Windsor Locks mills, Ct., and pay them $35.00 per month. They gather rags from as far distant countries as Egypt.

Troy, New York, is the "head centre" for the manufacture of paper and linen collars and cuffs. Nearly 50,000,000 of these very necessary articles are turned out annually, and 17,000 people are employed in their manufacture.

Paper is now coming into use for water-pails, pans, pots, and cooking utensils generally. It is found, when properly prepared, preferable for these purposes.

A scheme is afloat, amongst very influential Swedish proprietors, including Prince Oscar, to utilize the larch forests of the country in a new fashion by manufacturing paper out of timber. Improved machinery for the purpose has lately been procured in England.—*Journal of Applied Science.*

Lucius W. Pond of Worcester has shipped the heaviest iron turning lathe ever made in that city. It weighs thirty-five tons, was valued at $9000, and has been purchased by the Holyoke Machine Company, Holyoke, and will be used for making paper machinery and water-wheels.

The paper mill located at Union Deposit, Pa., was totally destroyed by fire on the evening of May 21st. Mr. W. S. Coffman was running the mill on manilla paper, he renting it [illegible] from Mr. J. H. Ebersole, the owner of the property. Insured for $15,000. It will not be rebuilt.

THE PAPER TRADE JOURNAL.

ITS BEGINNING A QUARTER OF A CENTURY AGO.

The First Number and Its Contents—The Lines of Conduct Marked Out for the Publication—Prices of Rags at That Time—The First Advertisers—The Various Offices of the Paper—Its Growth and Accomplishments.

THE first number of THE PAPER TRADE JOURNAL appeared on May 27, 1872, being issued from 14 Park place. The paper consisted of four pages, each sheet being 18¼ inches by 23¾ inches, each page containing seven columns. It began life as a semi-monthly, being issued on the 1st and 15th of each month.

The first page was devoted to the most important news, and the first article on that page was one on that old-time, but yet unsettled, question of "The Tariff on Paper, Books, Etc.," showing that in those days they had their troubles. Another article was entitled "The Sanitary Authorities and the Importation of Rags," and that subject has furnished the topic for very many articles since that time. "Anglo-American Copyright" is the title of another article on a subject which was not settled at that time, and which has not yet passed altogether into oblivion. Then came a column telling of new corporations, followed by a budget of manufacturing news.

The second page was devoted, in part, to editorial matter, including a prospectus and an article on the need of a paper trade journal. The prospectus is so characteristic of Howard Lockwood, who founded THE JOURNAL, that it is herewith printed entire. It is as follows:

PROSPECTUS.

In introducing the first number of THE PAPER TRADE JOURNAL to the public we wish to call attention, first, to the need of a high-toned and superior journal to represent the American paper interest, and, secondly, to the mode in which we propose to carry on this periodical.

In all kinds of industry, owing to increased competition and other causes, it is becoming necessary to carry on business with greater exactness and care. Hence the periodical that will furnish full, trustworthy information in relation to any given interest cannot fail to benefit all those connected with that interest. Knowledge is power, and all the information relating to the paper manufacture and trade which can be presented will add to the knowledge of each subscriber and reader of such a journal and so increase his capacity for conducting his business successfully.

As an organ of the latest ideas, discoveries and opinions of the trade, it will also become so representative in character as to prove indispensable to every paper dealer or manufacturer who wishes to know what others are doing in the occupations in which he is concerned.

Such a periodical should have the following features, which will be found in the present JOURNAL:

First, it should belong to and be conducted by persons who are in no way pecuniarily connected with the trade, so that its independence and freedom from personal bias or interest may be assured.

Second, its manager should have a good knowledge of the paper business, and of the wants of those in the trade. The proprietor of this journal having lately left the paper trade, in which he has had large experience, to become engaged in the publishing business, these two important conditions are hence fulfilled by him to the letter.

Third, such a journal should be issued at least twice a month, and even oftener if possible, in order to give frequent and fresh news of all kinds.

Fourth, it should contain, together with articles on matters of interest to the trade, a careful review of the state of the market in the different grades of paper, paper stock, chemicals, coloring materials and all kinds of supplies, with reliable quotations of the same from unquestionable sources.

Such are the features which we believe should belong to a good trade paper. Whether the present journal fulfills these conditions must be left to our readers to decide, but we can at least claim that having raised so high an ideal we are more likely to deserve support than if we had started with a lower standard of excellency.

The principles enunciated in the prospectus have been the guiding stars of THE JOURNAL in its twenty-five years of work, and the position which it holds in the trade demonstrates beyond question the firm foundation upon which it was based and the fidelity with which those principles have been followed through all these years.

Upon the second page there was a full line of market quotations, and a stock man smacks his lips as he looks over the figures ruling then. As an indication of the prices then in force, it may be stated that fine No. 1 white shirt cuttings were quoted at 10½ to 11 cents; city whites, at 7¾ to 8 cents; No. 2 whites, 5¼ to 6 cents; city seconds, 2⅝ to 3½ cents; manilla rope, 5¼ to 5½ cents; gunny bagging, 3¾ to 4 cents; jute butts, 3¼ to 3½ cents; all paper white collar cuttings, 8¼ to 8½ cents; No. 1 white ordinary shavings, 7½ to 7¾ cents; No. 1 soft white shavings, 7¼ to 7½ cents; best folded sheets, No. 1 imperfections, 6 to 6¼ cents; No. 1 book stock, 4¾ to 5 cents; commons, 1 to 1⅛ cents.

In English rags, cotton cuttings were quoted at 9¼ to 10 cents; out shots, 5¾ to 6¼ cents; seconds, 5 to 5¼ cents; checks and blues, 4½ to 5½ cents; light fustians, 4¾ to 5 cents; dark fustians, 3½ to 3¾ cents; No. 1 gunny, 3⅝ to 3⅞ cents; manilla rope, 5¼ to 5½ cents.

On Hamburg rags the quotations were: SPFFFs, 8⅜ to 8¾ cents; SPFFs, 7 to 7½ cents; SPFs, 6 cents; extra fine blue linens, light colors, 6 to 6½ cents; CSPFFFs, 7¾ to 8 cents; CSPFFs, 6 to 6¼ cents; CSPFs, 4½ to 4¾ cents; extra fine blue cottons, light colors, 5½ to 6 cents.

Leghorn rags were quoted at 7¾ to 8½ cents for PPs, 6½ to 6¾ cents for SSs, 4½ to 5 cents for RRs, 7½ to 7¾ cents for Ps, 5¼ to 5 cents for Ss, 4 to 4½ cents for Ts.

Upon the third page was a directory, which is yet one of the features of the paper; a synopsis of recent patents granted to workers in the paper industry, importations of paper, paper stock and paper makers' supplies, and a medley of general news.

The fourth page was almost wholly devoted to advertisements. Among the advertisers in this first number were: Taylor & Darrow, both members of which firm are now dead; R. B. Briggs & Co., the senior member of which is now engaged in the cattle business in the West; Perkins & Goodwin, the style of which house is now Perkins, Goodwin & Co., the junior member of the then firm having joined the majority, while the senior, who was recently the president of the American Paper Manufacturers' Association, now the American Paper and Pulp Association, is yet the active head of the business. Brautigam & Watson, successors to White, Sheffield & Co., had a prominent place on the page. Of this firm, George Watson, Sr., has gone to his long rest, while J. C. Brautigam is engaged in another line of business. H. C. Hulbert & Co. also had a prominent place. This house is doing business now under the old firm style, with H. C. Hulbert yet at the head of the house, and has added to its laurels as the years have rolled by. Goodwin, Cobb & Co., as well as some of the advertisers in that first issue, have gone out of business as firms, although individual members are yet identified with the trade. E. R. & T. W. Sheridan, now T. W. & C. B. Sheridan, had an illustrated advertisement showing their patent sliding knife paper cutter, while the Daniels Machine Company, of Woodstock, Vt., of which Reuben Daniels was proprietor, illustrated and described, in the largest announcement on the page, "the only self-feeding paper-stock cutter manufactured in this country." Another machinery advertisement was that of Taylor & Brightman, Cleveland, Ohio, who manufactured a patent corrugated engine roll and bedplate, and yet another was the Holyoke Machine Company, manufacturer of the "American" turbine water wheel and a line of paper-mill machinery. This company is a leader in the ranks, and, like H. C. Hulbert & Co., another advertiser in the initial number, continues to make its announcements through the columns of THE JOURNAL.

Besides these there were display announcements by James F. Porter, 69 Duane street; William Kelley & Sons, 66 Sheriff street; Hugo Fett & Co., importers of Hamburg rags, 48 New street; Bargh, Warren & Co., paper dealers, 16 South Sixteenth street, Philadelphia, and J. Baird & Co., importers of Italian rags, Philadelphia.

In the directory column referred to were announcements of Brautigam & Watson, then at 63 Beekman street; Bulkley, Dunton & Co., then at 74 John street, and now at 75 Duane street; Goodwin, Cobb & Co., 16 Reade street, and Harris Brothers & Co., 49 John street, both of whom are now out of existence; C. B. Hewitt & Brother, then as now at 48 Beekman street; H. C. Hulbert & Co., then at 13 Beekman street, and now at 53 on the same street; G. W. Millar, then at 10 Spruce street, and now at 62 Duane street; John J. Murphy, then as now at 47 John street; Perkins & Goodwin, then at 84 Duane street, now at 66 on the same street; Platner, Miller & Co., then at 32 Beekman street; M. Plummer & Co., then at 161 William street, and now at 45 Beekman street; James F. Porter, 69 Duane street; J. Q. Preble & Co., 77 White street, now out of business; John Priestly & Co., 33 Beekman street, now out of business; Vernon Brothers & Co., then at 65 Duane street, now at 22 Reade street; and Wilkinson Brothers & Co., 72 Duane street, now at 419 Broome street. These firms' cards all appeared under the head of "Paper and Paper Makers' Supplies."

The straw-wrapping trade was represented by Cornell & Cave, then at 172 Fulton street; Hedges & Morse, then at 180 Fulton street, and D. D. Tomkins, who was in Barclay street, while among the paper makers in the directory were Ira Beebe & Co., 27 Beekman street, N. S. Briggs, 41 Barclay street, John T. Hoag, 27 Chatham street, and H. A. Philp & Co., 109 Reade street. The paper-stock men were represented by R. B. Briggs & Co., C. H. Buckley, Hugo Fett & Co., William Kelley & Sons, Owen Keenan & Co., P. Kildea, Charles P. Spaulding, John C. Stockwell and E. W. Taylor & Co. Allen Brothers, Sandy Hill, were the sole representatives of the hanging paper interests. Bradner Smith & Co., the Claremont Manufacturing Company, the Cleveland Paper Company, Davis & Moore, McIlwaine & Co., the Rockland Company, and the Stewart Paper Company all had cards, while in manilla paper there were Dillingham & Co., C. H. Dexter & Son, Haumen & Fales, Howland & Miller, George S. Sheldon & Co., and Oliver Woodworth. The paper makers who were represented were Morrison, Bare & Co., the Star Paper Company, George Robertson & Son and John Robertson.

The second number of the paper was issued on June 15, 1872, and both in the quality of its reading matter and the quantity of its advertising was an improvement upon the initial number. Among other things it contained a list of prominent mills which had sent in their subscription and had aided the new enterprise in a variety of ways.

Among the editorials was one under the caption of "This Is an Independent Journal," in which it was stated that "as there seems to be some doubts about the matter among a few of our out-of-town correspondents, we repeat what we said before with proper emphasis in our prospectus, namely, that this journal is independent and free from interest in any clique or single firm in the trade, and that it will not cater to the wants of the metropolitan district alone, but to the interests of the whole trade, and thus be truly representative in character. No newspaper can be of value or deserve support upon any other condition than these, and it is our prime object to maintain the most perfect independence that is possible." The proposition which was enunciated in the first issue and which was reiterated in the second issue has always been and is to-day the guiding principle of THE JOURNAL.

In the first issue of THE JOURNAL it was stated that the retail price was 5 cents. This was an error, which was corrected in the second issue, wherein the price was stated at 10 cents. In issue No. 19, dated March 1, 1873, the paper was enlarged, a column being added to each page, while the pages themselves were also lengthened. On June 15, in order to accommodate the growth of the paper, an eight-column supplement was published, this being the first supplement ever published by THE PAPER TRADE JOURNAL.

The paper prospered. People found in it that which was of value to them, and subscriptions and advertisements both came along in a liberal and encouraging way. There were established in it a stationers' department and a bookmakers' department. These developed to such an extent that the former expanded into *The American Stationer*, a weekly devoted exclusively to the interests of the stationery and fancy goods trade, its first separate issue beginning with No. 20, April 6, 1874, and the latter in 1885 took separate form as *The American Bookmaker*, a monthly publication treating of printing and bookmaking.

In 1873 was published the first edition of Lockwood's Directory of the Paper Trade, which was an outgrowth of and an auxiliary to THE JOURNAL.

From 14 Park place the office of THE JOURNAL was removed to 36 Beekman street, right in the heart of the paper district, but a demand for more room later led to another change, the establishment being removed to 74 Duane street, where it remained until 1883, when it again sought larger quarters and found them at 126 and 128 Duane street, in the building now occupied by William Pickhardt & Kuttroff. In 1895 the quarters there became cramped, and the business was removed to the seven-story building corner of Bleecker street and West Broadway, where it now is.

THE JOURNAL during all these twenty-five years has kept in close touch with the paper trade in all its branches, and its columns contain a pen picture of the movements of the various branches, and of the individuals interested in them, during all that time. It has kept abreast of all the developments of the trade, and in every way has stood for the best thought and deed of the whole paper-making industry. From a four-page semi-monthly it has grown to be a twenty-page weekly, each issue crowded with a chronicle of the doings in the various paper-manufacturing centres and paper markets of the country.

In its technical department it has had the services of able, skillful, educated men, specialists in their lines, who have given to the trade the work of their pens through its columns. Its correspondence is full and complete each week, there being presented a pen picture of the work going on in the various marts.

It has closely followed the inventive genius of the country as shown by the records of the Patent Office, and has been prompt to describe and illustrate the latest inventions of the day.

To descriptions of current events it has always given full space, and a perusal of its columns is simply a reading of a history of the entire trade. Each week it places before its readers exclusive news, displayed in a proper setting.

THE JOURNAL has always stood for anything which benefited the whole trade. Wherever it has observed influences harmful to trade it has opposed them, and wherever shams have appeared it has denounced them. A recent instance of this was in the case of a man who was constantly organizing new companies, each one having the vital part of the name of some prominent concern, and then buying paper from mills all over the country. There were enough gullible sellers to give the rascal a good living, for he paid for none of the goods which he bought in this way. THE JOURNAL investigated the matter, followed up the methods of the fellow, spread them before the trade, and it is hoped saved a number of mills a considerable amount of money. The buyer has not been heard of in some time. From time to time THE JOURNAL has also exposed fraudulent failures, bringing to light the facts for the benefit of all, while it has fallen to its lot on several occasions to assist materially in unearthing customs frauds.

The period of time covered by the publication of THE JOURNAL has been one of revolution, so far as methods of manufacture and so far as the class of raw material are concerned. At the time of the first issue straw was the stock which, next to rags, was most used. Ground wood had been introduced about six years before, and was gaining ground in the favor of the manufacturers, although the total output of it then was very small, as compared with that of to-day. Now straw is not a factor in the making of print paper, while ground wood is the raw material which regulates the price not only of print but of other grades of paper.

Soda fibre twenty-five years ago was in use, but there were only a few manufacturers of it, and it was nowhere as generally used as it is now. Sulphite fibre, while a fact, was not a factor as a raw material in American paper making. Tilghman had discovered it, but had given it up after losing time and money. The idea was then developed across the water, and only a comparatively few years ago this idea, worked out in a practical way, was transferred to the country where it originated. It took strong root, and in the course of only a very short time grew to be a sturdy plant. Although it is only a decade since the starting of the first mill, which made a success of the manufacture financially, the increase in the number of mills and consequently of product has been sufficient to cause over-production and to force down prices, and to compel manufacturers to look for export trade.

When THE JOURNAL came into the world jute butts were of very considerable interest to the trade, and for years afterward large quantities of them were consumed by paper manufacturers. Wood has driven them out of the field, owing to the fact that they cannot compete as to price. Some butts are yet used in the trade, but that stock no longer cuts any serious figure from the manufacturer's point of view.

In the early days rags were, of course, the staple and foundation stock, and there was scarcely a mill in which they were not used. To-day many mills never have rags within their doors, except such as the modern paper manufacturer claims to be wearing, while a very much larger number used only a small percentage of rags. It used to be said by the maker, "I'll guarantee that that sheet is of all rag stock;" now he says "I'll guarantee that that sheet is of all wood stock, without a trace of rag." In the olden days a paper manufacturer was ashamed to acknowledge that he used wood. Now he glories in the fact that he can make a fine sheet of paper entirely of the once despised stock. This shows very effectively the overturning which has taken place in the industry in one line alone.

LOCKWOOD'S DIRECTORY.

THE HISTORY OF THIS STANDARD PUBLICATION.

The First Volume Published in 1873—The Second in 1875—It Became an Annual in 1877—The Growth of the Trade as Pictured in Its Pages—Brewer's Manuscript Directory.

Lockwood's Directory came to life in 1873, the first volume being issued in August of that year. Up to that time there had been no published mill reports which were at all reliable, and even the United States census reports could not be trusted. The work of gathering the necessary information as to the mills was laborious and slow, and in closing the preface to the first volume of the directory Mr. Lockwood said:

"In approaching manufacturers for the necessary information to compile this directory, the few rebuffs received will not prevent the publisher from mentioning with pleasure the general courtesy that has always been shown him by the trade in all sections of the country, and he desires to express his hearty thanks for the complete manner in which his blanks sent to different parties have, in the great majority of cases, been filled out. The confidence thus shown in putting in his possession information of many important details of their business is fully appreciated by him, and he pledges himself, as from the beginning, not to use such information except in the general manner it now appears."

The United States census for 1870 only reported 669 paper mills in the country, whereas Lockwood's Directory, published three years later, reported 820 mills in operation, together with forty-three in course of construction. Mr. Lockwood was exceedingly proud of that first number of the directory, and in order to satisfy everyone that he had exerted himself to have it first class in the mechanical as in every other respect, he stated in his preface that the paper on which it was printed was made at the mill of Peter Adams & Son, Buckland, Conn., and was furnished through Melvin Hard & Son, of New York; that it was printed by Francis Hart & Co., now Theodore L. De Vinne & Co., then at 12 College place, New York, and that it was bound by James Somerville, 43 Centre street, New York.

The directory was a great and instantaneous success, and those who wished to do business with paper mills at once recognized the advantages which its publication presented to them.

A glance through the book shows that in 1872 there were in the United States 820 paper mills, 812 of which were operated by 705 concerns, while eight were idle. In these mills were 299 Fourdrinier and 690 cylinder machines, and 3,296 engines, producing 317,637 tons annually, that product being valued at $66,505,825. The value of the mill plants was estimated at $35,564,500. The reports showed that there were 13,427 male and 7,700 female adults and 922 children engaged in the industry, whose wages aggregated $9,552,146.

It is curious to look through the mill portion of the book. At Holyoke there were the Albion Paper Company, Beebe & Holbrook, the Crocker Manufacturing Company, the Felton Paper Company, the Franklin Paper Company, the Holyoke Manilla Mill, the Holyoke Paper Company, the Parsons Paper Company, the Riverside Paper Company, the Union Paper Manufacturing Company, the Valley Paper Company, Warren & Dickinson, and the Whiting Paper Company. At Lawrence there were J. A. Bacon-Davis, Rook & Pope, the Munroe Paper Company, the Russell Paper Company, William Russell & Son, and S. W. Wilder, while Lee boasted of P. C. Baird, Benton Brothers, Chaffee & Hamblin, Harrison Garfield, May & Rogers, Owens & Videtto, John H. Royce & Co., and the Smith Paper Company. At Franklin the Winnipiseogee Paper Company was satisfied to make 14,000 pounds of book and news and 8,000 pounds of pulp a day. At Ballston Spa there were Jones & Cook, John McLean, the Milton Paper Company, E. P. Schoonmaker and George West & Son, the latter making six tons a day of manilla and straw wrapping. At Glens Falls the Glens Falls Paper Company was making "print, manilla and wrapping," with a capacity of three tons a day. Miller & Churchill had mills at Herkimer, Little Falls and Lyons Falls, making six tons of wood and rag print at the two first mentioned places and six tons of ground wood at the last mentioned, while the Hudson River Paper and Pulp Company was making two tons of news and five tons of colored and envelope at its Palmers Falls mills, as well as twelve tons of wet ground wood. At Watertown there were Knowlton Brothers, the Remington Paper Company, Taggarts & Davis, and the Watertown Paper Company, and so it ran all through the book, and plants which to-day are known for their immense tonnage were then comparatively insignificant.

The second number of the directory was published in July, 1875, when the number of paper mills in the country had increased to 896. The paper for the book of that year was furnished by Henry Lindenmeyr and the printing was done by S. W. Green. The first and second numbers of the directory were sold at $5 each, but in 1877, when the book became an annual, the price was reduced to $2. It steadily grew in circulation. Those were the days of little things, and one is particularly struck with this when in looking over the latest Lockwood's Directory he sees the Hudson River Paper and Pulp Company with a daily capacity of 145 tons, the Glens Falls Paper Company with 265 tons, the Niagara Falls Paper Company with 120 tons, the Otis Falls Pulp Company with 100 tons, the Rumford Falls Paper Company, 112 tons, the Glen Manufacturing Company, 130 tons, all in news; the Duncan Company with a daily capacity of 40 tons, Jessup & Moore Paper Company 45 tons, and others with heavy production in book.

In writing paper the mills under the control of the Whiting Paper Company produce 26 tons of writing paper per day, an amount which if stated to a maker of years ago would have injured him by the shock it would have administered. In manilla, wrapping, strawboard, pulp boards, tissue, and in fact in nearly all grades, there has been this same tremendous increase in tonnage, and where in days of twenty-five years ago, when THE JOURNAL was started, product was stated in pounds it is now put in tons. This development has not been in the East alone. In the West and Northwest the march of improvement has been equally great, and localities which when the first number of THE JOURNAL was issued were wastes of woodland are now energetic paper-producing communities. When one takes a file of the directory and examines it carefully, making comparisons as to firms, States, localities and grades of paper, he cannot fail to be astonished at the wonderful changes which have taken place in the paper-manufacturing industry. The advance has been made at a terrific pace, and those who realize this and who are watching the course of events are asking: "What of the future?" From year to year improvements were added to the directory, such as special lists of manufacturers of blank books, pads, tablets, envelopes, paper bags, waxed and vegetable parchment papers, as well as of surface-coated papers, and these lists have been of very material service.

As was stated the first directory reported 820 paper mills in the country. In the second number 897 mills were reported, while by 1880 937 were reported, this number increasing to 1,158 in 1890. In 1893 the number rose to 1,240.

The following table shows the mill statistics for each year as reported in the directory:

Year.	No. Mills.	Operating.	Idle.
1873	820	—	—
1875-6	897	—	—
1877	934	—	—
1878	948	—	—
1879	930	846	74
1880	937	889	48
1881	957	923	34
1882	1,004	974	30
1883	1,051	1,018	33
1884	1,081	1,049	33
1885	1,096	1,037	59
1886	1,066	1,000	66
1887	1,075	1,007	68
1888	1,079	1,010	69
1889	1,123	1,042	81
1890	1,158	1,086	72
1891	1,180	1,109	71
1892	1,213	1,131	82
1893	1,240	1,165	75
1894	1,231	1,136	95
1895	1,202	1,101	101
1896	1,190	1,065	125
1897	1,178	1,067	111

As the mill returns are each year received for the directory they are tabulated so as to make up the table of mill capacities, which is printed on another page. This table was begun many years ago, and originally was printed as a part of the directory. Of late years it has been furnished to the trade in the columns of THE PAPER TRADE JOURNAL, in the pamphlet containing the report of the proceedings of the meeting of the American Paper Manufacturers' Convention, and in loose sheets. There is a regular demand for it, and all through the year there are calls for it in some form. By it the great growth of the business can be traced very closely. A simple comparison of a few of the figures will suffice, those for the daily capacity in different grades for the years 1872 and 1897 being placed side by side:

	1872. Tons.	1897. Tons.
Writing,	76	414
Book and news,	305	3,490
Straw print,	47	—
Hanging,	29	83
Manilla,	130	1,278
Straw wrapping,	132	328
Wrapping,	115	435
Strawboards,	74	802
Binders' board,	33	113
Leather board,	10	56
Wood pulp,	66	3,224

A forerunner of Lockwood's Directory was one published by W. A. Brewer, of New York. The book was simply a specially prepared blank book, in which the information was written by Mr. Brewer. The title page, which is all in writing, reads: "Catalogue of Paper Manufacturers in the United States and Territories, Canada, etc., with the Statistics of the Mills, Compiled from Various Sources, 1864," and in the place which is ordinarily occupied by the publisher's imprint there appeared the name of the person or persons to whom the book was sold.

In his preface, under date of May, 1864, Mr. Brewer says:

"A manuscript catalogue in the possession of a manufacturer formed the basis of this. But the compiler has been enabled to correct and make additions to the address of mills in about seventy instances, and by personal interviews and correspondence with the proprietors of about 300 mills the statistics have been corrected or added to in about 500 instances. The columns denoting the investment in lands, buildings and machinery and the value of annual product constitute an original feature, so that while the present work cannot be supposed to be entirely perfect it may be fairly considered to be the most accurate catalogue of paper manufacturers and mills now extant."

Following the preface came a table of contents and then the main body of the directory. The pages of the book were 14x19½ and across the top of each was printed: "List of Paper Mills in the State of ———," the blank being filled up as wanted. The page was divided into eleven columns, the headings of which were printed in as follows: Names of mills and proprietors or agents; town or city where located; description of paper manufactured; engines, running time, cylinder machines, Fourdrinier machines; investment or capital employed in lands, buildings, machinery, etc.; value of annual product; number of hands employed, and remarks.

It is decidedly interesting to look through the pages. Maine is credited with sixteen paper-manufacturing concerns. Grant, Warren & Co. headed the list, and were reported as having three Fourdrinier machines, the widest 68 inches, and as employing 100 hands. It is also stated that they had $100,000 capital, and had a product of $400,000 a year. A. C. Denison & Co. were next on the list, with $100,000 capital and an annual output of $150,000. The other concerns in the State were Drake, Dwinal & Co., at Mechanic Falls; Richards & Hoskins, Copsecook Paper Company and the Great Falls Paper Company, at Gardiner; D. C. Stanwood, at Vassalboro; Crosby, Holt & Co., and J. & B. Crosby & Co., at Hampden; James Freeman & Co., at South Orrington; C. W. Denison, at Waterville; I. Laighton, at Portland; George F. White & Co.; Wm. Russell & Son and the Belfast Paper Company, at Belfast, and R. E. Lyon & Co., at Bloomfield.

In New Hampshire there were B. F. Martin, at Manchester; Flagg & Brother, at Exeter; Flagg & Russell, C. C. P. Moses, T. H. Wiswell & Co., and Howard Moses & Co., at New Market; Hunt, G. P. Hall, John Flagg, Hall & Burns, and Hathaway Rice, at Bennington; Simeon Ide and Ayer, Farrington & Co., at Claremont; Prentiss, Prouty & Co., at Alstead; Moses, Cheney & Sons, John H. Merrill, Mitchell & Shaw, Baker & Wright, Shaw, Ames & Co., J. F. Keyes & Co., and Scribber, Drake & Co., at Holderness; G. D. & D. S. Mason & Co., at Bristol; J. F. Daniell & Son and Charles Gould, at Franklin; Cheney & Morrison, and A. P. Morrison & Sons, at Peterboro; John M. Perkins, at Brentwood; W. H. Eastman & Co., Conway; E. C. Hutchins & Co., Haverhill, and the Claremont Manufacturing Company, at Claremont.

Thirty-five firms were reported as operating mills in Vermont, among whom Asa Low at Bradford appears to have been the king pin, as he had ten engines and three cylinder machines, being 32, 34 and 42 inches in width. He made wrapping and printing papers. At Putney Robinson & Brother, George J. Robertson and William Robertson were located. William Blake & Brother made print and hangings at Bellows Falls, and A. & W. Orr ran a one-machine mill on hangings at North Bennington, where also Thatcher & Welling had a one-machine mill with a similar product. There was only one Fourdrinier in the State, and that was operated by G. Benton & Sons, who made "fine ledgers" at Bennington, they having an invested capital of $40,000, while their annual output was valued at $60,000. They employed thirty-six hands. The widest cylinders were 56 inches, and of these there were three owned by L. Burgess & Co., at Milton; A. & W. Orr, at North Bennington; and D. P. Squires & Co., at Essex.

In Massachusetts Mr. Brewer reported 117 firms as employed in manufacturing paper. At Newton Lower Falls there were Thomas Rice, Jr., Moses Garfield, Lemuel Crehore, Thurston Priest and Charles Rice & Son; at East Walpole, F. W. Bird and F. W. Kennedy; at Milton, Tileston & Hollingsworth, where they had five mills, and operated two cylinder and three Fourdrinier machines; at Bridgewater were Lyman Hollingsworth, who also had a mill at Groton, and George Hooker; at Lawrence were William Russell & Son, James S. Munroe, S. W. Wilder & Co., Francis Curtis, and D. P. Crocker; at North Leominster were George W. Wheelwright and ——— Talbot; at Fitchburg were Jesse Lyon & Son, Crocker, Burbank & Co., Ware & Co., and Benjamin Snow, Jr.; at South Hadley were G. A. Smith and Ezra Allen; at Holyoke were the Parsons Paper Company and the Holyoke Paper Company; at Mittineaque, the Southworth Manufacturing Company and the Agawam Paper Company; at Westfield were Jessup & Laflin, with their Woronoco Mills, and Samuel Horton; at Springfield were A. L. Dunnell & Co., Nayasset Paper Company, and the Greenleaf & Taylor Manufacturing Company; at Dalton were Crane & Co., Carson Brothers, Brown & Hale, and A. S. Chamberlin & Co., while at Lee, including East and South Lee, were Elizur Smith, Benton & Garfield, May & Rogers, George W. Lynn, Tanner & Perkins, P. C. Baird, Chaffee & Hamlin, Orton Heath, and the South Lee Paper Company. Hollingsworth & Whitney were making manilla and bags at Watertown; Grant Warren & Co. had a news mill at Pepperell, and Chapin & Gould a writing mill at Russell.

Some of the mills were reported as running ten, twelve, fourteen, fifteen and sixteen hours a day, while a number are credited with making full time.

Connecticut was reported as having within her borders seventy-eight paper-making concerns, among whom were the Chelsea Manufacturing Company, A. Wicker and N. H. Hubbard & Co., at Norwich; Rogers, Boswell & Co., at Manchester; Simpson & Co., George Bunce & Co., Bosray & Co., Boswell, Keeney & Co., W. & E. Bunce, the Forest Mills Company, and Lewis Bune & Sons, at East Hartford; Goodwin & Sheldon, at Hartford; Persee & Brooks, C. H. Dexter, William English, Ira Outerson, Converse, Chapman & Burbank, and James Drake, at Windsor Locks; Platner & Porter, at Unionville, and Case Brothers and H. E. Rogers, at South Manchester.

New York is reported as having 323 firms engaged in the business, a very large number of whom were converting straw into paper. At Chatham there were three concerns, at Chatham Centre one, and at Chatham Four Corners ten. Troy had six manufacturers, Milton had five, Ballston Spa six, Little Falls seven and Watertown three. Nearly all the machines were of the cylinder type, only seventeen Fourdriniers being reported in the whole State. Among the product were writings, straw wrapping, strawboards, card, bonnet boards, printings, "coarse," and hangings.

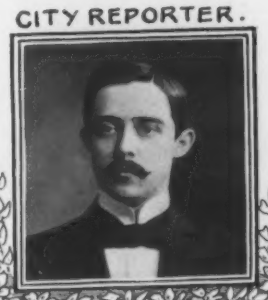
New Jersey had sixty-three firms in the business, the main paper-making centres being Morristown, Chatham, Bloomfield, Millburn, Springfield, New Prospect, Belleville and Trenton. Thirteen Fourdriniers were in operation in the State, the much larger number of machines being cylinders.

Delaware had only three concerns, they being Curtis & Brother, and R. Lysle, at Newark, and Jessup & Moore, at Wilmington.

Pennsylvania had 127 paper-manufacturing firms, and the reports from most of them were very meagre, there being no information beyond the name of the concern and its location. J. M. Dowdie, Thomas K. Amies, J. Ducket, J. M. Willcox & Co., E. C. & P. H. Warren, Joseph Stilwagon and Martin C. Nixon were all at Philadelphia; Givins & Brown, Robinson & Co., W. B. Mullen and S. & I. Lagg, at Papertown; S. B. & C. P. Markle and S. & P. Markle, at West Newton; Wolff & Heyser, William & J. Heyser, Jacob Heyser, Lambert & Hubert, and Stauffer, Strickles & Co., at Chambersburg; J. Howard Lewis and ——— Matthews, at Darby; Kempton & Mullin and Mullin & Son, at Mt. Holly Springs; Martin Nixon, Joseph Duckett and Fineous & Nixon, at Manayunk.

Maryland had 38 mills, the majority of them being at Elkton, Union Meeting House and Freeland; Virginia had 12, North Carolina, 2; South Carolina, 4; Georgia, 2; Tennessee, 5; Kentucky, 2; Ohio, 34; Michigan, 7; Indiana and Illinois, 15 each; Wisconsin, 5, and Minnesota, 1. The book, while it was, as its author claimed, the best up to that time, was woefully inaccurate, and yet withal it served its purpose well.

CITY REPORTER.



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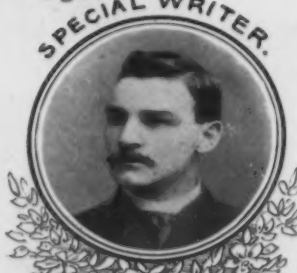

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THE PUSEY & JONES COMPANY,

WILMINGTON, DELAWARE, U. S. A.

BUILDERS OF

Machinery and Paper for Pulp Mills.

PATENTED SELF-LINING

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WELDED STEEL DIGESTERS.

**Fourdrinier and Cylinder Paper Machines, Wet Machines, Wood Grinders,
Wood Chippers, Kollergangs, Riveted Digesters, Rotary Boilers,
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Super Calenders.**

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AMERICAN STRAW BOARD COMPANY	1 Cylinder (three molds).
AMERICAN WOOD PAPER COMPANY	1 Fourdrinier.
BRADNER SMITH & COMPANY	1 Fourdrinier.
D. M. BARE & COMPANY	1 Fourdrinier.
BOWDOIN PAPER MANUFACTURING COMPANY	1 Fourdrinier.
BAEDER, ADAMSON & COMPANY	1 Cylinder (two molds).
CURTIS & BROTHER	1 Fourdrinier.
CLIFF PAPER COMPANY	1 Fourdrinier.
CAROLINA FIBRE COMPANY	1 Fourdrinier.
CANADA PAPER COMPANY, LTD., CANADA	1 Fourdrinier.
COLUMBIAN PAPER COMPANY	1 Cylinder (one mold).
DUPONT & COMPANY	2 Fourdriniers.
DELLS PAPER AND PULP COMPANY	1 Fourdrinier.
DRAMMENSELVENS PAPIRFABRIKER, NORWAY	1 Fourdrinier.
THE DUNCAN COMPANY	2 Fourdriniers.
EAGLE PAPER COMPANY	1 Fourdrinier.
EVERETT PULP AND PAPER COMPANY	1 Fourdrinier.
EVERETT PULP AND PAPER COMPANY	1 Cylinder (one mold).
EASTERN MANUFACTURING COMPANY	1 Fourdrinier.
FRIEND & FORGY PAPER COMPANY	1 Fourdrinier.
THE FALLS MANUFACTURING COMPANY	1 Fourdrinier.
P. H. GLATFELTER	2 Fourdriniers.
C. S. GARRETT & SON	1 Fourdrinier.
GLENS FALLS PAPER MILL COMPANY	12 Fourdriniers.
THE GLEN MANUFACTURING COMPANY	3 Fourdriniers.
GLEN MILLS PAPER COMPANY	1 Fourdrinier.
W. C. HAMILTON & SONS	2 Fourdriniers.
CHAS. HARTUNG'S SONS	1 Cylinder (one mold).
HUDSON RIVER PULP AND PAPER COMPANY	7 Fourdriniers.
HOLLINGSWORTH & WHITNEY COMPANY	3 Fourdriniers.
HAVERHILL PAPER COMPANY	1 Fourdrinier.
HELLER & MERZ COMPANY	1 Cylinder (one mold).
JESSUP & MOORE PAPER COMPANY	7 Fourdriniers.
JESSUP & MOORE PAPER COMPANY	1 Cylinder (one mold).
JAY PAPER MANUFACTURING COMPANY	2 Fourdriniers.
KIMBERLY & CLARK COMPANY	2 Fourdriniers.
KUβLER & NIETHAMMER, GERMANY	1 Fourdrinier.
KYMMENE AKTIE BOLAG, FINLAND	1 Fourdrinier.
JOHN LANG	1 Cylinder (one mold).
LAURENTIDE PULP COMPANY	2 Fourdriniers.
LAURENTIDE PULP COMPANY	1 Cylinder.
J. HOWARD LEWIS	1 Fourdrinier.
LOCKPORT PAPER COMPANY	1 Cylinder (four molds).
LAKE GEORGE PAPER COMPANY	2 Fourdriniers.
LISBON FALLS FIBRE COMPANY	2 Fourdriniers.
C. P. MARKLE & SONS	1 Fourdrinier.
MORRISON & CASS PAPER COMPANY	3 Fourdriniers.
WILLIAM MANN COMPANY	2 Cylinders (one mold each).
MICHIGAN WOOD PULP COMPANY	1 Fourdrinier.
M. & W. H. NIXON PAPER COMPANY	3 Fourdriniers.
NEW YORK AND PENNSYLVANIA COMPANY	3 Fourdriniers.
NEW YORK AND PENNSYLVANIA COMPANY	2 Cylinders (one mold each).
OTIS FALLS PULP COMPANY	1 Fourdrinier.
THOMAS OWEN & CO., LTD., ENGLAND	1 Fourdrinier.
PIONEER PAPER COMPANY	1 Fourdrinier.
PLEASANT MILLS PAPER COMPANY	1 Cylinder (two molds).
PETTEBONE-CATARACT PAPER COMPANY	1 Fourdrinier.
PIEDMONT PULP AND PAPER COMPANY	1 Fourdrinier.
PIEDMONT PULP AND PAPER COMPANY	2 Fourdriniers.
PLATTE RIVER PAPER MILLS COMPANY	2 Cylinders (one mold each).
READING PAPER MILLS	2 Fourdriniers.
S. A. RUDOLPH	1 Fourdrinier.
J. L. RIEGEL & SON	1 Fourdrinier.
H. POWELL RAMSDELL	2 Fourdriniers.
RICHMOND PAPER MANUFACTURING COMPANY	1 Fourdrinier.
THE SINGERLY PULP AND PAPER COMPANY	2 Fourdriniers.
THE SINGERLY PULP AND PAPER COMPANY	1 Cylinder (one mold).
THE SUSQUEHANNA WATER POWER & PAPER CO.	3 Fourdriniers.
JAMES SYMINGTON & COMPANY	1 Fourdrinier.
TALBOT COUNTY PAPER MILLS COMPANY	1 Cylinder (three molds).
TICONDEROGA PULP AND PAPER COMPANY	1 Fourdrinier.
TICONDEROGA PULP AND PAPER COMPANY	1 Cylinder (one mold).
THOMPSON PULP AND PAPER COMPANY	1 Cylinder (twelve molds).
THE TORNATOR COMPANY, LTD., FINLAND	1 Fourdrinier.
CHAS. L. VAN REED	1 Fourdrinier.
WARREN MANUFACTURING COMPANY	4 Fourdriniers.
S. D. WARREN & COMPANY	1 Fourdrinier.
H. F. WATSON & COMPANY	1 Cylinder (two molds).
THE WANAQUE RIVER PAPER COMPANY	1 Fourdrinier.
WEST VIRGINIA PAPER COMPANY	3 Fourdriniers.
WEST VIRGINIA PAPER COMPANY	1 Cylinder (one mold).
WEST VIRGINIA PULP COMPANY	1 Cylinder (one mold).
WILLAMETTE PULP AND PAPER COMPANY	1 Fourdrinier.
GEORGE W. WHEELWRIGHT PAPER COMPANY	1 Cylinder (five molds).
WISCONSIN RIVER PAPER AND PULP COMPANY	1 Fourdrinier.
THE YORK HAVEN PAPER COMPANY	3 Fourdriniers.

THE DAYTON GLOBE IRON WORKS CO.

Dayton, Ohio, U. S. A.,

HYDRAULIC AND MECHANICAL ENGINEERS,

Manufacturers of the New American Turbine and Machinery for Paper and Pulp Mills.

This company, whose plant and manufactures are illustrated herewith, was organized in 1853 as the firm of Stout, Mills & Temple, and began the manufacture of turbine wheels and appliances for the utilization of water power, achieving for themselves an enviable name at home and abroad, and a reputation for work of a superior quality.

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What more need be said, except to invite communication direct with us or our foreign agents, or refer prospective buyers to the many users of our machinery, lists of whom, together with much valuable information on hydraulics, may be found in our general catalogue?

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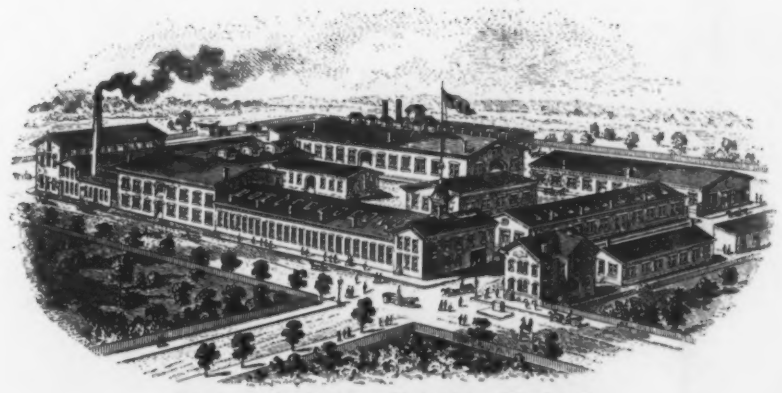
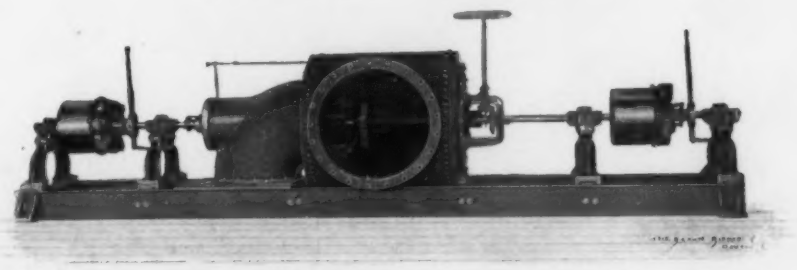
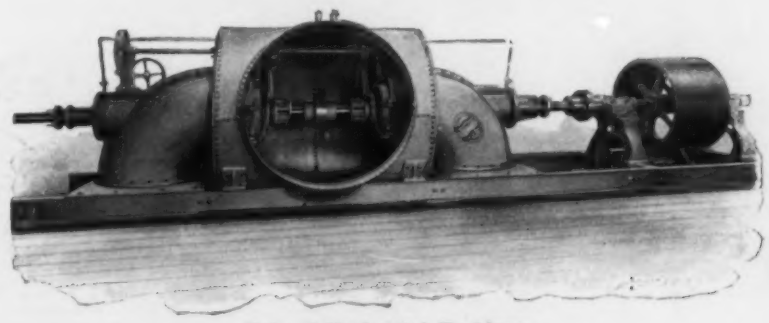


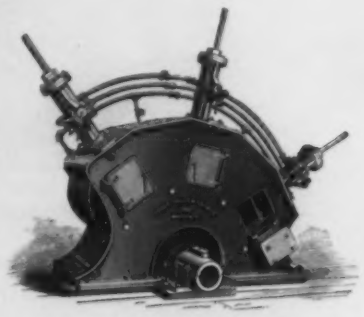
Shops of the Dayton Globe Iron Works Co.



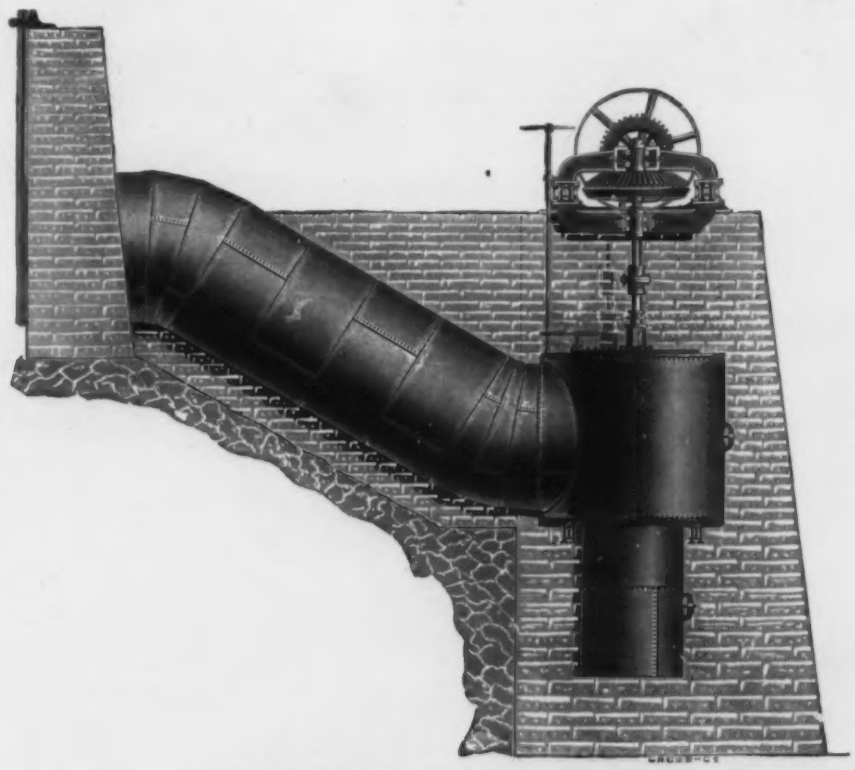
Horizontal Turbine Encased in Iron Flume.



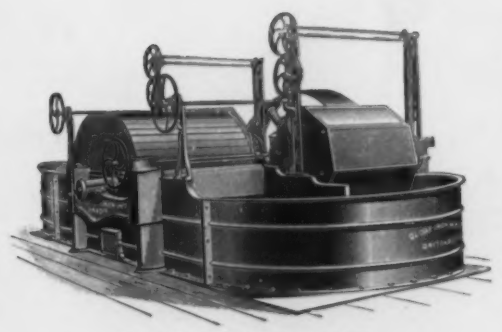
Pair of Horizontal Turbines.



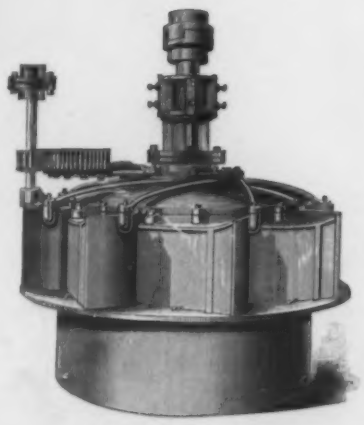
Wood Pulp Grinder.



Vertical Turbine Incased in Iron Flume.



Iron Tub Beating Engine.



Vertical Turbine.

Special Train of Machinery shipped to Fuji Paper Co., Tokio, Japan.

THE PAPER MACHINE.

ITS DEVELOPMENT AT THE HANDS OF AMERICAN BUILDERS.

The Sunnydale Mill and Its Thirty-six Inch Cylinder a Type of the Old—The Modern Machine a Gradual Growth—Improvements in All Its Parts—Speed Increased Four Hundred Per Cent. Since 1867—The Causes Which Have Contributed to That Result—The Largest and Smallest Machine—Will the Speed of the Future Be a Thousand Feet a Minute?

BY T. H. SAVERY.

NEAR the banks of the historic river Brandywine, a few miles from Wilmington, Del., is located a very small paper mill, in which there is machinery that will serve as a starting point for us in the consideration of the development of the paper machine, as it fairly represents the mills of long ago, when only one man was needed to attend to all the duties which are incident to the making of paper.

In this paper mill near Wilmington, known as Sunnydale Mill, there is in operation a one-cylinder paper machine, 36 inches wide, making about 1,000 pounds of tissue paper per week. Francis Tempest does all the work in this mill, and in this respect is, perhaps, different from any other paper maker in the world to-day. He attends to the buying and the boiling of the stock; to the treatment of it in the washing and beating engines; to the delivery of it to the stuff chests, and to the running or passing of it over the paper machine. The paper having been made and wound upon a reel, he then attends to the finishing, selling and shipping of it.

In order to accomplish all that must be done by him, he is obliged to make use of everything that art or nature has placed at his command. To illustrate the usefulness to him of what in almost all other mills would be considered an objectionable feature, in fact so objectionable that it should be removed at once, we shall mention the following fact:

One journal of the central shaft of the reel which receives the paper as it comes from the calenders is never oiled, but runs year after year in an iron bearing without lubrication. This unoiled bearing is naturally noisy at all times, but when the paper breaks the ever-listening ear of the proprietor at once detects an increase in the noise, which indicates to him that something has caused the paper to break in its passage over the machine. To the call of the squeaking journal he must at all times respond at once.

In other mills the shrill whistle of any person in the machine room is an alarm which is instantly recognized as an appeal for help. Everyone must run to the place where the break in the paper has occurred, and be oblivious to everybody and everything until the cause of the trouble has been removed. In Mr. Tempest's mill there is no fellow workman to sound an alarm by whistling: the noise of the unoiled journal of the reel must be relied upon to give notice to Mr. Tempest that his attention to the paper machine is required. It never fails to do its duty, nor to continue to sound an alarm until the paper is again running right and passing to the reel properly.

We have reason to believe that previous to 1867 the width of the widest paper machine was not more than 100 inches, and that the maximum speed at which paper was made did not exceed 100 feet per minute. In order to produce more paper from any one machine either the width or the speed would have to be increased. It was supposed by many that the limit in width had been reached at 100 inches, and the limit of speed at 100 feet per minute. To exceed either of these limits was a difficult task.

We can now appreciate the fact that it was more difficult to increase the width than the speed. The widest machines which have been built are 160 inches wide, an increase of width of 60 per cent. over those in existence thirty years ago. There are a few machines now running 500 feet per minute, an increase in speed of 400 per cent. over those of thirty years ago.

Carl Hofmann, of Berlin, Germany editor and proprietor of the *Papier Zeitung*, in his "Treatise on the Manufacture of Paper," published in 1873, writes as follows:

> If every part is constructed with the utmost care, substantially and true, a machine with a wire 33 feet in length, and seven drying cylinders of 3 feet diameter, can make news-print paper at a speed of from 110 to 130 feet per minute.
>
> The width of the machines has also been increased until wires 86 inches wide are now quite numerous, and some of 90 inches and even 100 inches are in use.

The above indicates very accurately the views of paper makers in 1873 regarding the width and speed of machines.

Wellington Smith, who is known to be authority in all matters pertaining to paper making, has stated that the Smith Paper Company, of Lee, Mass., increased the speed of one of its paper machines during the year 1866 or 1867 to 100 feet per minute. In his opinion no paper machine had been run so rapidly prior to that date.

In 1880 the Pusey & Jones Company built a Fourdrinier paper machine for P. H. Glatfelter, of Spring Forge, Pa., which was then considered the widest machine in the world, although it was only 1 inch wider than the one owned by the Smith Paper Company. We quote from a letter written by Mr. Glatfelter:

> You are correct in your impression that the paper machine which you built for us was the widest machine in this country. I remember plainly that the Smith Paper Company had a 100-inch machine, but it could only make 92 inches of paper. Our machine made 94 inches of paper. When George W. Childs, of the Philadelphia *Ledger*, contemplated purchasing perfecting presses which would require rolls of paper 94 inches wide, I told him that we could make a roll of this width, but he doubted the statement and sent his superintendent of machinery up here to look over the ground and see just what we could do. We convinced him that we could make such a roll, and they went ahead and put in their presses. Our speed was about 200 feet per minute, and at that time was the fastest on record in this country that we know of.

From the above it will be seen that the speed of the machine had been gradually increased from about 100 feet per minute in 1867 to 200 feet per minute in 1880.

A New Era in Machine Building.

Warren Curtis, with whose name we believe every well-informed paper maker in the world is familiar, in 1887 drew up specifications for a paper machine which represented what he thought a machine should be, and from these specifications a paper machine was built and placed in a mill at Palmer's Falls, N. Y. It was acknowledged to be far in advance of anything that had ever been produced in that line. Progressive and experienced paper makers flocked to Palmer's Falls to see a paper machine that was radically different from any other, and the general verdict was expressed when a prominent paper manufacturer, after examining the machine, exclaimed: "It is twenty years in advance of the times."

The Fourdrinier part of this machine was 112 inches wide; the wire was 50 feet long. The drying surface was considered immense, there being fifteen dryers, each of 48 inches diameter, arranged in two tiers, nine below and six above.

This machine marked an era in paper-machine building and in paper making. The frames, shafting, gearing and all the different parts of it were very heavy and substantial and adapted to the higher speeds which the longer wire and increased drying surface made possible. The Hazard patent swinging arm press-roll housing was invented for and applied to this machine.

This remarkable machine attained a speed of 250 feet very soon after it was first started, and the Hudson River Pulp and Paper Company justly claimed to have the finest and fastest machine in the world.

The paper-making community, however, was very active and restless during the decade between 1885 and 1895, and the enterprising neighbors of the Palmer's Falls Company, the Glens Falls Paper Mill Company, ordered in 1888 of the Wilmington builders a paper machine that was designed to be at least equal to the best.

Soon after this new machine was started at Glens Falls the writer stood in the machine room very early one morning, enjoying the impressions which the sight of a fast-running paper machine always creates. Charles Bragg was there with ever-watchful eye and unceasing attention, endeavoring to make the record of each day's run delight the hearts of the Parks brothers and to assure them that they had in their new machine one that could make paper faster than any other.

Sunnydale Paper Mill—Interior.

Three Hundred Feet a Minute.

Mr. Bragg was very much pleased with his efforts to make paper at 250 feet per minute, but was not satisfied and said to the writer: "If Mr. Parks will let me put on new felts I'll run the machine 300 feet per minute." Here then was found a combination which had been sought for, *i. e.*, proprietors who wanted 300 feet of paper per minute; a machine tender who felt able and anxious to run 300 feet, and builders who felt sure they could build a machine that could run safely and continuously at that speed.

Subsequently three other paper machines were built for the Hudson River Pulp and Paper Company, similar in most respects to the one built in 1887, and placed in the same machine room with it. The last of the three was purchased in 1890. This machine soon gained a reputation for high speed, and at one time there was no other place in the world where a paper machine could be seen making 325 feet of paper per minute than at Palmer's Falls, N. Y.

In 1895 the Glens Falls Paper Mill Company placed in its paper mill at Fort Edward, N. Y., the sixth paper machine. About the time this machine was being built in Wilmington, Del., the American yacht "Defender" won the international yacht race and thus secured to this country the continued possession of the famous America Cup. Anticipating that the performances of this paper machine would be correspondingly satisfactory and that it would hold the world's record for greatest speed, it was decided to give it the name of the winning yacht, and therefore with common consent it was known as the "Defender."

The name chosen—"The Defender"—was an appropriate one, as this paper machine made another one of the steps now being chronicled. The increased length of wire, the increased drying surface, stronger and larger driving train and the now famous patented shaking frame at the end of the Fourdrinier part all had their influence in producing the higher rate of speed with which this machine astonished the world. Every new feature added materially to the efficiency of the machine, and the combination gave to the world another record breaker in 1895. This machine has made continuously good merchantable paper at 450 feet per minute.

Five Hundred Feet a Minute.

The year 1897 finds four mills equipped with paper machines which can be relied upon to make merchantable news paper continuously at 500 feet per minute. These mills belong to the Glens Falls Paper Mill Company, of Glens Falls, N. Y., the Hudson River Pulp and Paper Company, of Palmer's Falls, N. Y., the Glen Manufacturing Company, of Berlin, N. H., and the Willamette Pulp and Paper Company, of Oregon City, Ore.

Prior to the year 1868 the speeds of the *several sections* of paper machines were changed by adding to or taking from the surfaces of the pulleys driving the said sections pieces of canvas. These pieces were glued to the surfaces of the pulleys, and were made long or short, in accordance with the machine tender's opinion of the amount required to obtain the desired results. Machine tenders of that day can well remember their troublesome experiences with canvas lagging and glue pots, and the loss of time occasioned by not adding to or taking from the pulleys the proper amount of canvas.

During the year 1868 Thomas Lindsay, a very able and progressive paper maker, had charge of the Augustine Mill, located near Wilmington, Del., owned by Jessup & Moore. He appreciated the importance of having pulleys made so that their diameters could be increased or decreased easily while they were revolving, and he did not rest nor feel satisfied until he had an expanding pulley made by the Pusey & Jones Company and applied it to the couch rolls on one of the three paper machines in the Augustine Mill. This expanding pulley proved to be a pronounced success, and others were soon applied to all the sections of the three machines in the Augustine Mill, and to three machines in the Rockland Mill, also owned by Jessup & Moore. This expanding pulley device was patented in 1869, and is illustrated and fully described in Hofmann's "Treatise on the Manufacture of Paper" (page 190), published in Philadelphia, Pa., in 1878.

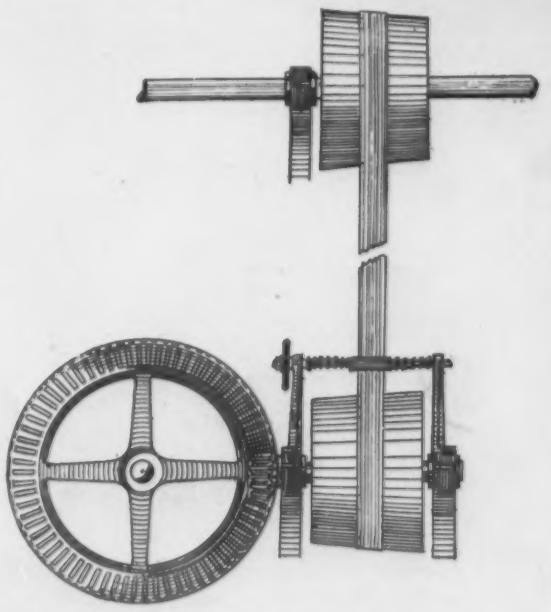
The Cone Drive.

The demand for expanding pulleys was great, and it continued to increase as their value was recognized and appreciated, until the cone drive was invented. This new system, in which cones and bevel gears were used, was illustrated and described by Carl Hofmann in the French edition of his meritorious "Treatise on Paper Making," published in Paris in 1877. In this book may be found, on page 317, an illustration and description of the cone drive, invented by Messrs. Jouffray, Cadet & Sons.

Mill owners in this country at first opposed the use of spur wheels and bevel wheels. They regarded them as objectionable and hesitated to apply the cone drive to their machines, because it necessitated the use of a pair of bevel wheels for each section of the machine. Meantime the paper makers were assiduously endeavoring to speed up their machines to increase the amount of paper produced. The speed of the expanding pulleys had been increased from time to time so much that it was difficult to increase or diminish the size of them, and the cone drive was adopted principally because it could be used and adjusted with equal facility at any speed. The long and wide belts, which occupied so much floor space on the driving side of the machines where expanding pulleys were used, were dispensed with where cone pulleys were used. The long horizontal belts to a great extent prevented free and easy access to the frames of the machine on the driving side. When, therefore, it was found that with cone pulleys, narrow, fast-running belts could be used, located and running where they did not occupy valuable floor space, the cone-pulley drive soon became a favorite and superseded expanding pulleys.

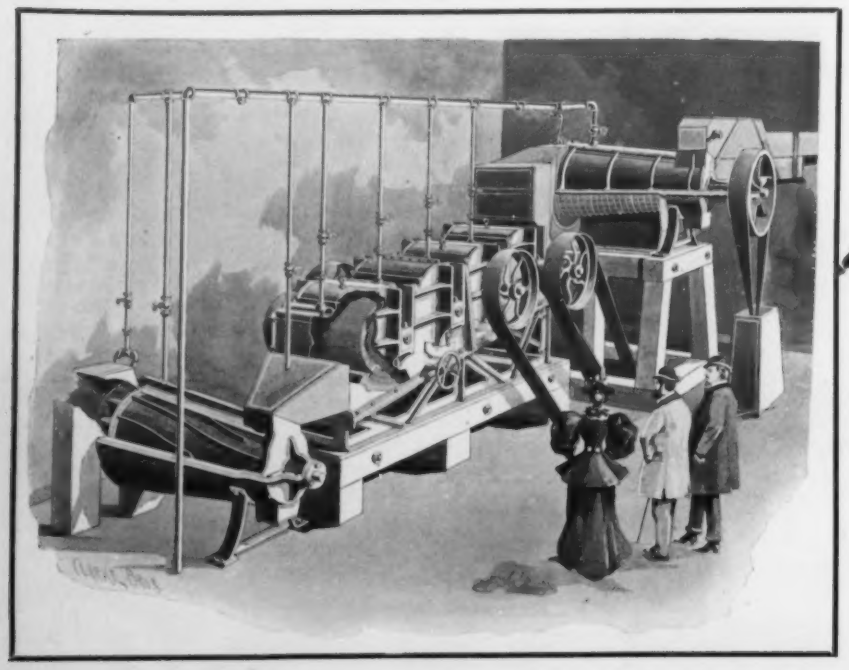
Although the principal features of the cone system yet exist as at first adopted, the proportion of parts and the character of the attachments are very much changed. The largest bevel wheels used when the cone-pulley system was first introduced did not exceed 37 inches in diameter, with a face of about 3 inches. In some cases we now find large mortise bevel wheels 53 inches in diameter, 8 inches face.

To America belongs the credit of having furnished the first expanding pulley with sufficient merit to warrant its general application to paper machines, but to France belongs the credit of introducing the cone-drive system, which, although open to some objections, has distinguishing and meritorious features which have led to its almost universal adoption. The cone-drive system was described and illustrated in Mr. Hofmann's book as noted, but it was really brought to the attention of mill owners and practically introduced into this country by George E. Marshall, of Turner's Falls, Mass. He obtained a United States



Cone Drive.

Kelly's Beating and . . . Washing Machine.



SOLD UNDER A STRONG GUARANTEE.

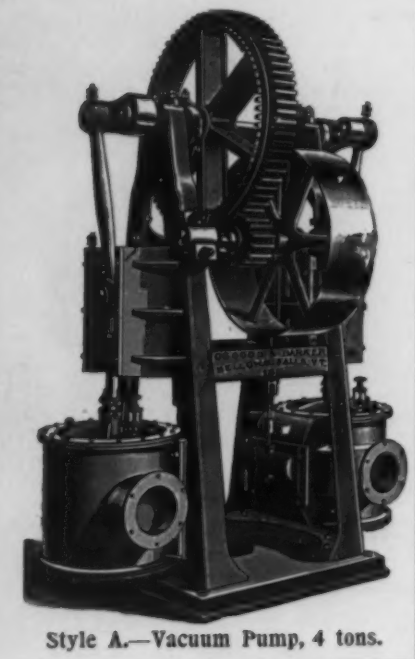
CAPACITY:

Twenty tons of half-stock in twenty-four hours with one hundred horse power.

FOR FURTHER PARTICULARS ADDRESS THE MANUFACTURERS,

The O. S. Kelly Company,

SPRINGFIELD, OHIO, U. S. A.



Style A.—Vacuum Pump, 4 tons.

IN March, 1871, Osgood & Barker bought out a very small machine shop and a smaller foundry, the site of which has been many times built over to suit the enlargement of this town, and though we do not make any pretensions of abnormal growth, we have made some considerable advance from those early days when the bosses and all the machinists used to lend a hand when the two or three moulders got up a melt, but we don't do that now, though we pour some castings weighing 6 tons.

These shops were soon found to be too small for the business these two young men started up, and the fourth move finds us in our comparatively new shop, 275 ft. long x 60 feet wide, pretty well filled up with new and first-class machinery.

Among our first orders was one for ten small-size Hollander Engines, and to-day we are working on the best of all the engines on the market, the "Conley Revolving Bed Engine." While we have not built as many paper machines as some of the other builders, yet what we have made are running with satisfaction to the owners and credit to ourselves. We were the first to bring out the three-deck drier frame, and no better commendation can there be than to have others copy the same in every detail, which has been done.

But we did not do our best in this style of frame till the latest design was made, which embodies all that can be sought for—beauty of form, the acme of ease and simplicity with which the machine tender can manipulate the paper as he passes it over the seeming complications of the three tiers of driers. This arrangement makes the most economic plan, because it takes one-third less floor space, the heat is more concentrated, and therefore used to better advantage. Its special sphere is in slow-running machines, where a great number of driers are required to dry the heavy grade of papers. We have built them with 28 inch, 36 inch and 48 inch diameter driers, and can make them five, seven or more tiers high if required. Two felts will cover all that is necessary in either case.

We were also the first to bring out so large a Vacuum Pump, used in some sulphite processes for making pulp, as 24 inch diameter and 18 inch stroke, which had at that time just twice the capacity of the then largest pump.

After making three complete sets of patterns, our fourth embodied all the best ideas in the experience gained, and is to-day without an equal for stiffness, solidity, its many points of excellence and price, taking all these things into consideration. This pump is our style B, as here shown, the weight of which is about 9½ tons.

We have a style C Vacuum Pump, which was made before our B, that weighs 17 tons, and the style A, 4 tons, so that the whole range of buyers can be accommodated.

Our Chippers, too, have been through a series of growth and development, beginning with a 6-inch knife and now in our Giant we use a 30-inch knife. Only two or three of the 6-inch knife machines are now in use, but our happy medium has taken a decided stand and is most satisfactorily approved by those using them. One very reliable firm writes us "that the capacity of the chipper is only determined by the amount of wood the man tending it can handle." In this size we can put four, six or eight knives,

C. W. OSGOOD, Proprietor.

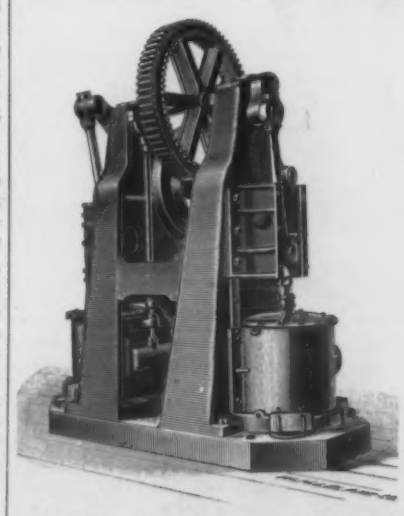
according to size of the wood it's ordered to cut. The eight knives for small slabs and edgings from saw mills will cut up a lot of it, because a revolution means eight chips.

The position of the feed box to the surface of the disc is specially our own, and the greatest part of the weight of disc is placed to be of most service in cutting wood. This is as good and we think a good deal better than any other chipper where price, weight and ease in running under hard work are considerations of the buyer.

But then we have a chipper big enough for Chicago, or east or west of it for that matter. The disc is over 9 feet diameter and weighs over five (5) tons, the bed nearly two and one-half (2½) tons. A firm owning such a chipper would have "an elephant on their hands" in the amount of work it would turn out in a day. Just think of that weight in motion. You cannot guess how long that machine would chop wood after the transmitted power was shut off? We don't claim to make power by using it, but it will save power by using it in comparison with any other chipper that will cut up the same amount of wood in a given time, because our weight is applied to give force to the blow, and the knives and feed box placed where it will work the easiest, and the best of it all is the long shims are conspicuous by not being there. We have also been very successful in introducing into our drier bearings a roller bearing that works like a charm, charming away the friction and great strain required to turn the ordinary babbitted bearing. Have them working under driers running 375 feet per minute, and with five 36-inch by 72-inch driers; before being piped up could be turned with two fingers, and those that did it were not cracks or jim-cracks either, but men whose word would not be doubted. We consider this as decided an advanced step as any concern has made in the past year, notwithstanding we are not classed in with the largest and widely known paper machinery builders of this country, but we take great pleasure and pride in mentioning in this special edition of our trade paper a few of the specials we make that do not compete with these big competitors because they don't have them.

We are sole manufacturers of the Roberts Grinder Co.'s Grinder, the machine that oscillates the wood over the face of the stone, and with down pressure cylinders; the grade of the pulp can be made to suit the most particular, and we notice that our boxes are not as hot as other designs that apply the pressure above and below the centre of the shaft. We also have the right to manufacture the celebrated "Conley Revolving Bed Engine" that ought to take the place of all others, because it does the work so nicely, easily, simply, rapidly, with a saving of a big per cent. in power for operating over any stationary bed-plate engine in use. You can readily see how this can be when by those using the ordinary bed-plate what a drag it is all the time over 8 in. to 12 in. of dead surface, and of necessity how slow it goes through. Compare this with the line of contact between two circles—how that must get down to the smallest parts of the fibre, and drawing those smallest particles out, because the surface speed of each roll is not the same, but they rotate in the same direction, and can you imagine a device that will pump the stuff around from one side to the other as quickly as this motion does it?

Further information about these or other of our specialties will be cheerfully answered.



Style B.—Vacuum Pump, 9½ tons.

OSGOOD & BARKER, BELLOWS FALLS, ...VERMONT.

patent for the device and all who used cone-driving arrangements were obliged to pay Mr. Marshall a royalty. This device was popularly known as the "Marshall Driving Train." An existing law pertaining to patents makes a patent invalid if it can be proven that a description of the invention had been published in this or other countries prior to the granting of the patent. We have reason to believe that there was at the time the Marshall patent was issued no other copy of Hofmann's treatise (French edition) in this country than the one owned by the writer of this article. In that book was described and illustrated a cone drive precisely like that which had been patented by Mr. Marshall in this country. The patentee borrowed the book, and after carefully examining the illustrations and description concluded that his invention had been anticipated and his patent therefore invalidated by the French inventor.

Screens.

While the driving arrangements of paper machines have been going through successive stages of development, as already described, all the other parts of the paper machine have likewise been receiving an equal amount of attention by the inventors and builders at large, with a view of making them more efficient and more convenient for the machine tenders, and consequently more remunerative to the mill owners.

In regard to screens this close attention resulted in the production in 1881 of the Gould screen, which was so much better than other screens then in use that it became a general favorite. For many years it continued to be used in paper mills to a great extent, superseding every other kind of screen. Almost every specification that was written for a paper machine called for one or more Gould screens. If mill owners wanted to make strawboard, binders' board, wood-pulp board, roofing paper, manillas, news, book or writing papers, they would order Gould screens. Even to-day some manufacturers prefer them to all others, and in Germany, where able, scientific and experienced manufacturers of paper have devoted much time and attention to the subject of screens, the Gould is highly appreciated.

It has, however, been found that for some kinds of stock suction screens are better than Goulds, and in many cases where sulphite and ground wood are used the Gould has been superseded by suction screens. Of the latter class the Gotham and Eclipse screens have had an immense sale and are considered among the best.

Shaking Arrangement.

A radical change has recently been made in the shake frame and its atachments.

The Monumental shake post that had been the favorite for several generations was abruptly abandoned. The patented bell-crank shake post, designed and patented by a party who resided in Wilmington, Del., is so much better in many respects than anything previously produced that it has been applied to many machines, both old and new. The shake head rests directly upon the floor. No special foundation is required for it. It is constructed so that it will shake only what it should shake. The Monumental shake post had a tendency to shake itself, its foundation, and many things besides the frame which it was designed to shake; in this respect it was a very objectionable affair.

It is difficult for parties who have not made an especial study of paper machinery to appreciate the impediments which builders encountered in their efforts to produce a high-speed machine. In order to illustrate how conditions are changed when passing from a low to a high speed the following is given:

At all ordinary speeds the water which passes from the pulp through the wire as it is carried over the table rolls will always flow downward over the surface of said table rolls against the movement of this surface and of the wire; in other words, the water will flow down the up-coming table roll surface nearest to the breast roll. When the speed is increased to and beyond a certain given point or amount, the water will flow down the opposite side of the table rolls, viz., the down-going side toward the couch rolls. Engineers who fail to discover these important changes cannot be expected to provide for them, and if they are not provided for the laws of nature will assert themselves, to the surprise and disappointment of interested parties.

It will be observed from the above that under certain conditions tons and tons of water are daily flowing in one direction, and if these conditions be changed only in the one feature of speed this immense mass of water will flow in the opposite direction.

Dash Boards.

A quantity of water is removed from the pulp through the wire at every point where the wire rests upon a revolving table roll or any carrying roll located between the slices and the suction boxes. The speed at which the wire is moving determines and controls the action of the water thus removed. If it be moving slowly, dash boards are unnecessary; if it be moving rapidly, the surfaces of the table rolls will move so fast that much of the water will be thrown from them in tangential lines in all directions, like the sparks from a pin wheel. Part of it will be thrown downward into the save-alls, as it is desired that it should be, but an important part of it will be thrown upward against the wire and into the space between the table rolls, where it comes in contact with other drops of water thrown from the adjacent rolls and prevents them from passing downward into the save-alls.

This consideration led to the invention and application to fast-running paper machines of the dash board.

To determine that dash boards will do their duty thoroughly, it is only necessary to observe the flow of water from them downward into the save-alls. In fact it has been found that the dash board enjoys the unusual reputation of being a device that does its duty too well. Only a limited number of them can be used on paper machines running at ordinary speeds, because they will remove, or rather prevent, the return of so much water that has been removed from the pulp by the table rolls as to make the pulp too dry upon its arrival at the first suction box.

When paper is being made more rapidly than it now is, and the wire and pulp are passing with a velocity that will tend to cause it to move in a straight line as a ball does from a rifle, then every table roll should have a dash board adjacent to it, to direct downward the course of every drop of water thrown by the roll, so that it will not interfere in any manner with the formation of the sheet of paper.

Dash boards were first applied to a paper machine built by the Pusey & Jones Company for the Glens Falls Paper Mill Company, of Glens Falls, N. Y., in 1894.

Sunnydale Paper Mill—Exterior.

The unparalleled results which are now being obtained from paper machines could not have been reached if builders had not given especial attention to what many would regard as matters so unimportant as to be unworthy of consideration. As an example of this we would mention the "end-thrust device for rolls of paper machines."

End Thrust for Table Rolls.

This invention accomplishes two desirable things thoroughly. Every roll attached to the shaking frame, including, of course, the breast roll, is moved endwise to and fro, from 200 to 300 times every minute. Heretofore, prior to the date of the invention above referred to, the thrust required to move these rolls endwise in harmony with the shaking frame was applied by bringing the surface of the collars at ends of journals into contact with the end of the bearing box in which the journal runs. This acted like a frictional brake for each roll, and the delicate wire was obliged to overcome the undue resistance created thereby. This is quite different from the "end-thrust" device, for with it the extreme diameter of the journal is the largest boundary line of the frictional surface, and the surfaces of contact are steel and brass instead of brass and brass, as is usual in cases where the "end-thrust" device is not used.

One relatively large revolving surface thus comes in contact under pressure with a surface that is not revolving, and the undue amount of friction thus created tends to stop the revolving of the roll, and a strain is thrown upon the wire. The only thing we depend upon to revolve the whole system of rolls is the wire, and this delicate and expensive article of machine clothing is frequently so overtaxed that it lasts only a short time. It is quite evident that whatever is done to lessen the strain upon it will tend to lengthen the term of its usefulness, and will be welcomed by those who have to use or to purchase wires.

This end-thrust device not only lessens in a great degree the friction of the table roll, but it also prevents each roll from moving a greater distance to and fro than the wire moves. The wire is not worn by the slipping of the rolls upon which it is resting, and its existence is thereby materially prolonged. With this end in view the Pusey & Jones Company has equipped all of its finest Fourdrinier paper machines with a device which throws the endwise thrust directly upon the extreme ends of the steel journals of the rolls, thus reducing the friction and consequent strain upon the wire to a minimum.

These end thrusts are constructed so that each one can be adjusted independent of all the others, and any wear which might occur and would give to the roll a freedom of movement it should never have can at any time be corrected by the adjusting device referred to. In this manner each and every roll may be caused to move to and fro in harmony with the entire system, and the wire and pulp resting upon it will be moved or shaken to any desired extent, with a result that is astonishing to those who have fancied that because the shake frame had a decided movement and the rolls were obviously moving endwise the wire and pulp upon it were also moving properly.

The fact is that very often the wire is moved but little, and the rolls are actively, but not in harmony of action, thrown from one side to the other, slipping under the wire and doing but little good. The shake frame, constructed as described herein, will move every roll endwise just to the extent they should be moved, the rolls in turn will positively move the wire, and the wire will move the pulp which rests upon it, so that the formation of the sheet will be as perfect as possible.

Sunnydale Paper Mill—End View.

Wash Troughs.

As the speed with which paper was being made increased, it became evident that the brass-flanged wheels carrying the deckle straps on their return passage could not be continued in use, because when they were revolved rapidly by the fast-running deckle strap, the water and pulp which collected upon them were thrown by centrifugal force in a manner to spoil the formation of the sheet. This led to the invention and introduction of what is known as the "deckle wash trough."

Supporting wheels are not used in this device, but the deckle strap is supported, guided, washed and partly dried as it passes at any desired speed through the ornamental and substantial brass attachment termed the "wash trough."

The first deckle wash troughs were applied to a paper machine built by the Pusey & Jones Company for the Glens Falls Paper Mill Company in 1894, and in testimony of the fact that they proved to be valuable and accomplished what they were designed to do it may be stated that every Fourdrinier paper machine built by the Pusey & Jones Company since that time has been equipped with them.

Press-Roll Housings.

Perhaps the first patent ever obtained for a design of housing and equipment of same for press rolls was the one granted Vincent G. Hazard, February 23, 1889. This patent embodied the principle of the swinging arm to hold the journal bearing of the upper roll in place, the housing on one side only, and also the separate and easily removable pedestal for the journal bearing of the lower roll. The simplicity of this housing and the space and facility afforded the machine tender when removing either roll or putting on felts soon made it a favorite. It is in use in almost every paper-making section of the country, and is yet built for machines having press rolls not exceeding its capacity in weight.

Subsequently, in 1892, Alfred Henry Smith, a mechanical engineer, of Wilmington, Del., modified the swinging arm design of Hazard's patent by adding an additional arm at right angles to it, thus making a bell crank, the vertical arm being connected to the lifting gear, and horizontal arm to the journal box of press roll. This change was made for increased power in the gearing, and also that the hand wheel used to raise and lower the press rolls might be brought down to a point so near the floor that the machine tender standing on the floor could operate it to advantage. It was no longer necessary to climb up on the frame of the machine in order to reach the hand wheel, and this new design soon became a general favorite.

It is a surprising fact that the mechanism of this bell-crank housing is so complete and perfect that a pair of press rolls weighing 11,000 pounds each can be raised quite rapidly and easily by the effort of one man. The lifting arrangement, although so complete and powerful, is so small and so neatly and compactly placed in respect to the housing that it might not be observed at all unless attention should be called to it.

The first bell-crank press-roll housing that we have knowledge of was designed by A. H. Smith in 1892, and used in the mill of the Hollingsworth & Whitney Company.

On June 20, 1893, a patent was granted A. Aldrich, of Beloit, Wis., for a press-roll housing which embodies some good features. It is claimed that the housings and all their attachments are made so that no part extends upward above the top roll journal.

Press Rolls.

Previous to 1864 press rolls were made, some of wood, some of iron and others of iron covered with brass.

During the year 1864 James Bennett Forsyth, general manager of the Boston Belting Company, succeeded in covering press rolls with rubber. The first rubber-covered press roll that went into practical service was probably used at the Cumberland Mills, Maine.

We have been informed that the first rubber-covered press rolls used in a paper machine making news were ordered by Warren Curtis, of the Hudson River Pulp and Paper Company, and were applied to one of that company's machines at Palmer's Falls.

The rubber-covered rolls press more evenly and do not injure the felts as much as the metal rolls. They also have other points of merit well known to paper makers. The result is they are used as lower rolls for presses in almost every modern paper machine.

Ordinarily, only two pairs of press rolls are used, but there are a few machines equipped with three pairs. By the use of a third press the water may be removed from the paper more gradually, and possibly the paper may be passed to the dryers with less moisture in it than if two presses only were used.

Dryers.

Prior to 1888 the web of paper was taken from the second press rolls over a carrying roll above the upper press roll, then carried a distance of several feet to another small carrying roll quite near the first dryer, then downward to the point where the dryer felt clamps it to the surface of said dryer. This delicate, newly formed sheet would not only have to draw and keep in motion the relatively long portion of said sheet extending from the point indicated to the place where it left the second press rolls, but would also have to revolve the two carrying rolls

THE BLACK & CLAWSON CO.,

HAMILTON, OHIO, U. S. A.

PATENTED

EXPANDING PULLEY CUTTERS.....

BLACK'S PATENT DRYER.

OVER 1,800 IN DAILY USE.

Medal Awarded at World's Fair for our Seamless Dryer.

THE origin of the BLACK & CLAWSON COMPANY dates back to 1856, when Peter Black became associated with John M. Long and Robert Allstatter under the firm name of Long, Black & Allstatter, for the manufacture of Harvesting Machinery and Power Punching and Shearing Machines. In 1871 Peter Black retired from this partnership and soon after organized the firm of Peter Black & Sons for the manufacture of a general line of machinery. In 1873 Mr. Frank Black of this firm, a practical machinist of wide experience, spent several months at nominal wages in the shops of J. Morton Poole of Wilmington, Del., who at that time was the only manufacturer in the United States of calender roll grinders. He mastered the art of roll grinding and secured for his firm the first roll-grinding machine that was operated west of the Alleghenies.

The location of this grinding machine in the Miami Valley at that time was a great convenience to the many paper mills in the West, and caused them to place orders with the firm of Peter Black & Son for much other paper-mill work in addition to the grinding and regrinding of calender rolls. The quality of the work and the promptness in filling orders caused the business to increase rapidly.

In 1875 Mr. Linus P. Clawson was admitted to the partnership, which was continued under the firm name of Black & Clawson, and consisted of Peter Black, Frank X. Black and Linus P. Clawson. In 1878 this firm manufactured its first complete Fourdrinier paper mill, and disposed of it to the Harding Paper Mill Company of Franklin, Ohio. This mill produced fine-class writing paper and has been in continuous use since it was built and is still in operation, in good condition and doing satisfactory work.

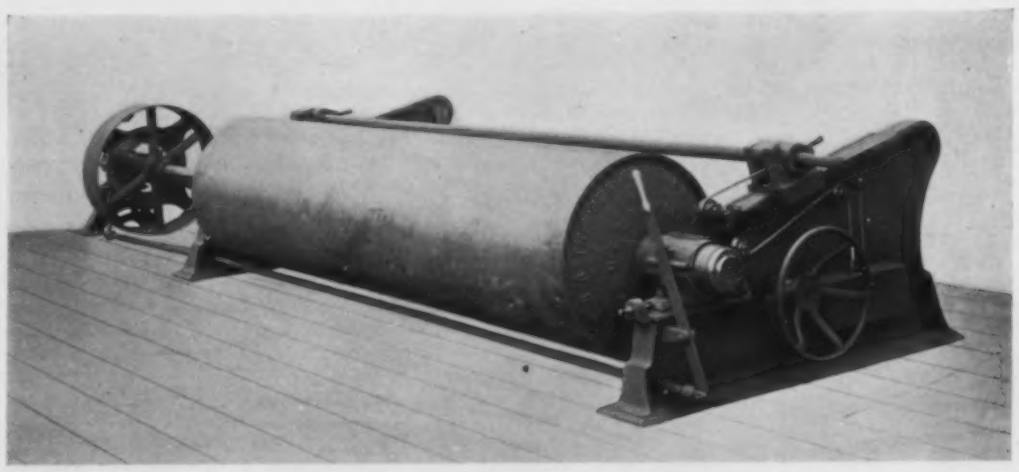
No. 10.
Improved Calender Stacks with Feed Finger Doctors.

From the introduction of the roll-grinding machine to the building of this first complete paper mill the progress of the business was gradual. The business now became so large that it became necessary to build the present commodious shops to accommodate the demand for complete paper-mill machinery.

In 1883 the Black & Clawson Company was incorporated with an authorized capital of $125,000, which amount was soon after increased to $250,000. Mr. Frank Black became President and Linus P. Clawson Secretary, and the Company succeeded the firm of Black & Clawson.

The success of the business has been phenomenal and principally due to the mechanical skill and untiring energy of Mr. Black. He has always given his personal attention to every detail of the manufacturing department, which secured for this Company a wide reputation for unexcelled workmanship and promptness in filling orders within the time specified.

Mr. Frank X. Black is still the President of the Company, and devotes his entire time to its manifold interests. Every department is under his personal supervision, and is wisely conducted by his long and wide experience.



No. 12.
Improved Self-Contained Drum Winder, Principally for Winding Newspaper Rolls on Fast-running Machines.

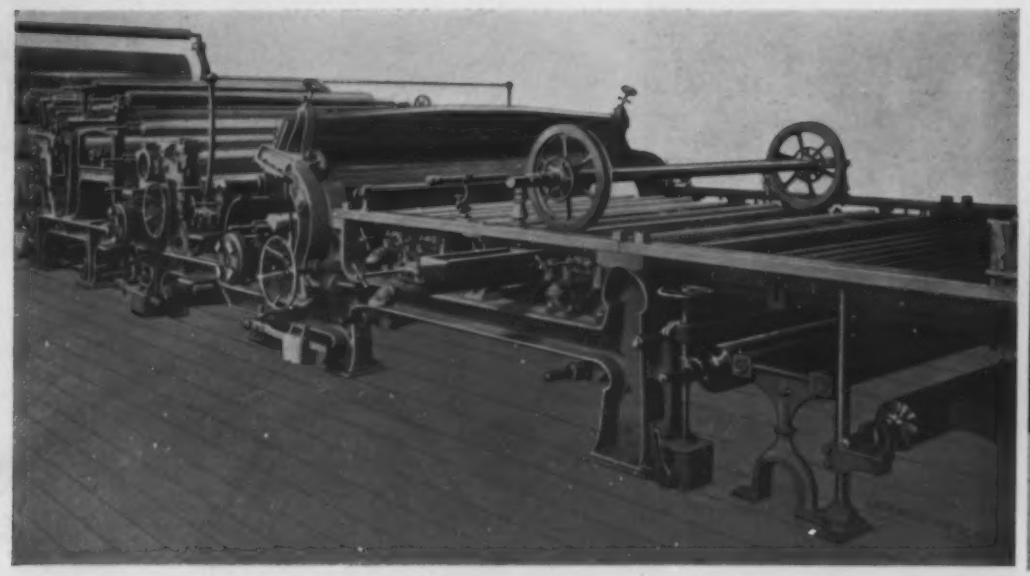
PAPER MILL MACHINERY....

OF ENTIRELY NEW DESIGN.

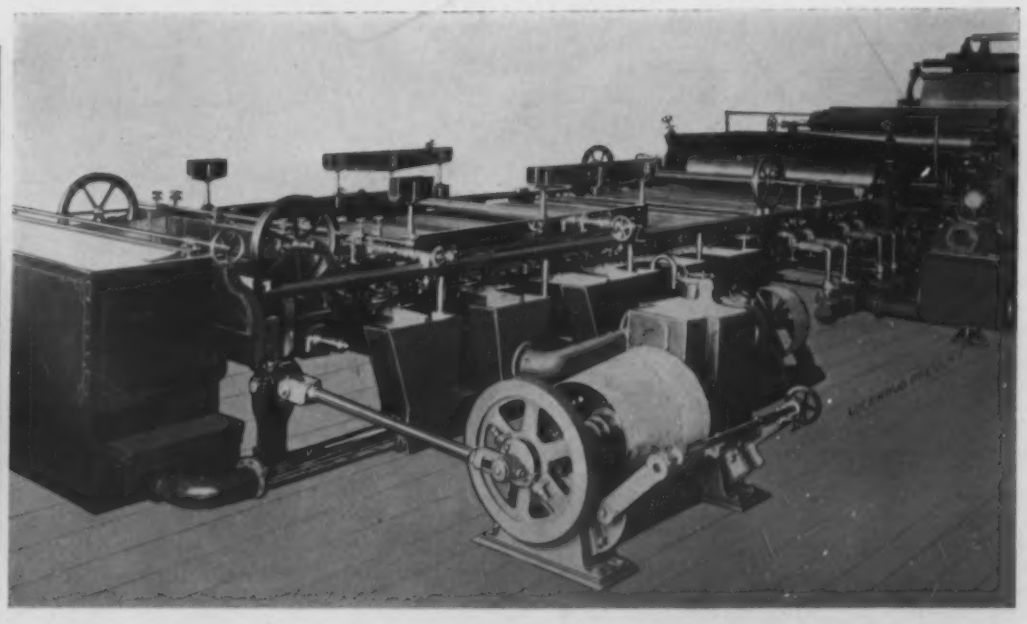
Fourdrinier and Cylinder Machines,
Diaphragm Screens, Jordan Engines,
Revolving Reels, Stack Reels.

ADDRESS

The BLACK & CLAWSON CO., Hamilton, Ohio, U. S. A.



No. 8.
Improved Suction Box, Couch and First Press Arrangement, as furnished the Oji Paper Co. and the Tokyo Straw Board Co. on their recently built Machines.



No. 3.
Fourdrinier part (back side) with latest improvements, including new principle shake device, our own invention. The wire is 60 feet by 98 inches. Built for the Oji Paper Co.

located between the presses and dryers, which are referred to above. The tensional strain thus placed upon the sheet caused a material diminution in its width. It was evident that the fibres were disturbed to an extent that injured the sheet. To prevent this disturbance, and at the same time to remove some moisture from that side of the sheet of paper which would soon come in contact with the dryer felt, a large steam-heated carrying roll termed an "over-hanging dryer," driven by gears, was substituted for the small paper-carrying roll nearest to the first dryer. This change was important, and its almost universal application to modern paper machines is positive evidence of its worth and value. Almost one-half the former strain upon the paper at this point was removed by the use of the over-hanging dryer, and this, accompanied by other advantages which it possessed, soon led, as stated above, to its almost universal adoption. Over-hanging dryers were first used in a paper mill at York Haven, Pa., owned by the York Haven Paper Company, during the spring of 1888.

The first paper machine that was made with a dryer in upper tier overhanging toward the calenders, the last dryer in lower tier, was built in 1894. The necessity of this over-hanging dryer being attached to fast-running machines was suggested by Fred H. Parks, of Glens Falls, N. Y. The builders of the machine appreciated the fact that it would be almost impossible for a machine tender to deliver paper at very high speeds to the calenders from the dryers if the paper came from the last dryer in the lower tier in the usual way. They therefore at once embodied in the design of the paper machines which they were then building for the Glens Falls Paper Mill Company the over-hanging dryer toward the calenders. This paper machine was placed in a mill at Fort Edward, N. Y., and was the first to attain a speed of 400 feet a minute.

In the gradual development of the drying part of the paper machine it will be noted that during the past thirty years the drying surface has been increased from a surface represented by ten drying cylinders, 3 feet in diameter, to that represented by thirty drying cylinders 4 feet in diameter, and in some cases a few additional drying cylinders have been added for drying the felts.

Still keeping "high speed" in view, it was considered necessary to change the form of the side frames supporting the dryers, so that no part of them would interfere with the actions of the machine tender as he passed the paper from one dryer to another throughout the entire system. Dryer frames made from

SUNNYDALE PAPER MILL—EXTERIOR.

the old patterns, which had answered well when machines made but from 200 to 300 feet of paper per minute, would not answer at all at higher speeds, but would effectually control and limit the speed of the machines. The builders have now adopted dryer frames of designs that will admit of the paper being passed through the system at any attained or desired speed.

FELT TIGHTENERS.

The automatic felt tightener is a valuable attachment to any paper machine, as it will keep the dryer felt pressed against the surface of the dryers with a given and determined uniform pressure at all times. The importance of this every practical paper maker can appreciate. The amount of pressure can be easily regulated by the operator, and whatever may be required can readily be obtained.

The length of the dryer felt varies as it becomes more or less damp. Previous to the invention of the automatic felt tightener a great injury to felts and to felt-roll journals and bearings was occasioned by the felts becoming more damp and consequently shorter and tighter without being observed by the machine tender. To properly tighten a dryer felt by means of the usual device of hand wheel and screws requires great skill and good judgment, even in cases where the felts are short and running slowly. When, however, the felts are long and running with great rapidity, it would be impossible to keep them tightened properly. The most skillful and experienced man might devote his entire attention to the felt and then fail to keep the right tension. The automatic felt tightener will accomplish what is required in a satisfactory and inexpensive manner.

CALENDERS.

The calenders have also received their full share of attention, and a review of what has been accomplished brings to light the gratifying fact that Americans have been very active in improving and perfecting the calender rolls, doctors and automatic calender feeds, as well as the other parts forming the equipment of a stack of calender rolls, such as are now used in paper mills.

About thirty years ago Garrison & Co., of Pittsburg, Pa., were applied to for a price on some chilled iron calender rolls, 6 inches diameter, 72 inches face. These parties had for many years been engaged in making chilled rolls for rolling mills, and were then regarded as among the most successful and expert in this country in the line of chilled iron rolls. They did not quote a price, but replied that they would not undertake to make rolls of the diameter and length specified, even if they were offered in return the weight of the rolls in gold. Long-continued experience has convinced them that it was not possible to make a chilled iron roll, with a good sound surface, the length of which exceeded five times the diameter of the roll.

It is evident, however, that the development of the calenders has kept pace with that of other portions of the paper machine, and when we consider the hardness of the rolls and the accuracy of the grinding, we are forced to the conclusion that the chilled iron calender rolls which are now made are really wonderful productions.

The first record that we have at our command of a stack of chilled iron calender rolls has been furnished by J. M. Poole & Co., of Wilmington, Del., who established a new system of grinding rolls, the fundamental principle of which is now generally used by all parties who grind rolls. They have written as follows:

The first stack of chilled calender rolls of which we have any certain knowledge was sent to us from the Farrel Foundry and Machine Company, of Ansonia, Conn., in September, 1868, to be ground. These rolls were made by the Farrel company, and ground, if we remember rightly, on a machine where the grinding wheel was supported on a bracket in the middle of the length of the bed, and the roll, on dead centres, was traversed back and forth across the face of the wheel. This method failed and the machine was condemned. The stack, consisting of two 12-inch and six 6-inch rolls, 66-inch face, we ground to the entire satisfaction of the purchasers.

If our memory serves us, there was a stack of chilled rolls made before this, either by the Farrel company or the Bassetts at Birmingham, Conn., but they failed because the makers could not get them straight, and they blacked the paper in streaks lengthwise of the sheet. The old soft rolls died instantly; in fact, we never had another order for a stack of them.

REELS.

The web of paper is practically finished when it passes away from the calenders, but it must be wound upon reels, passed through a trimming and slitting machine, and then wound into rolls or cut into sheets.

These several parts have been brought to a degree of perfection corresponding to the other parts. They have been modified and changed so as to meet all the requirements of a modern paper-making machine. They will reel, trim, slit and wind into rolls, news paper at from 500 to 530 feet per minute, which is the highest speed at which paper has up to the present time been made. Machines of similar construction will also reel, trim, slit and cut into sheets either paper or boards of any thickness or weight that the market demands.

Several meritorious designs of reels have been brought to the attention of paper makers, but no one pattern has proved so pre-eminently satisfactory as to supersede all others. Some manufacturers prefer revolving reels and some upright reels.

The Pope brothers, of Wisconsin, invented a device by means of which the web of paper was cut square and true by means of a knife attached to the drum, and automatically clamped the sheet to the incoming winding drum. It seemed as if the entire field of reeling had been covered when the automatic revolving reel with Pope's attachment was developed. It has been found, however, in practice that this attachment of Pope's works well under some conditions, but not under all.

Pope's revolving reels carrying four or six winding drums were constructed and equipped so that when the roll of paper upon one reel had become sufficiently large the operator had only to press his foot heavily upon the end of a lever, and at once the side frames supporting the drums would commence to revolve and continue to do so until the incoming drum reached the right position; then the revolving frames would be stopped and become locked fast until the foot lever was again disturbed. Meantime, as the said frame supporting the drums was being revolved one-fourth or one-sixth of a revolution, in order to bring an empty drum into the position which the full drum had occupied, the paper continued to follow and be wound upon the filled and moving drum, keeping in motion until the incoming drum was ready to receive it. At this time the knives attached to the incoming drum would cut the web of paper and clamp it firmly to the drum. The reeling would thus be continued without interruption or loss of paper.

Several of the automatic revolving reels with Pope's attachment are in use, but the upright reel with from two to four winding drums is generally preferred. These upright reels are as free from complicated attachments as it is possible to make them. On almost all of the largest and fastest-running paper machines in this country the two-drum upright reel is used on account of its simplicity and efficiency.

TRIMMING, SLITTING AND WINDING.

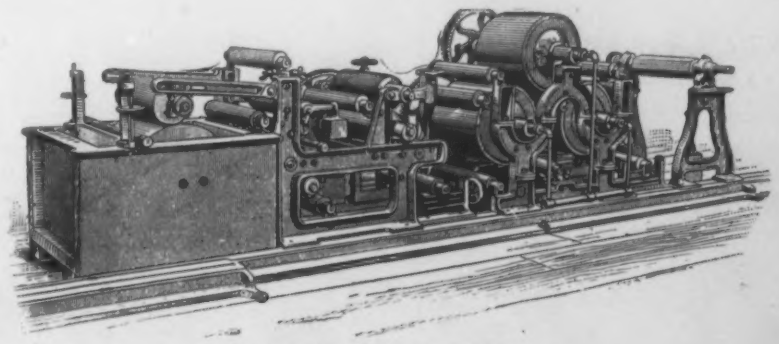
The trimming, slitting and cutting or winding of the paper is now generally accomplished by machines which resemble in their fundamental principles those which were used about a quarter of a century ago. We still have stop cutters and continuous feed cutters of several designs. Each variety or style is found to possess some features which make it pre-eminently good for some certain conditions or duties. When the manufacturer determines what he wants done in the way of cutting the paper into sheets or winding it into rolls it is not a difficult matter for him to select from the assortment a machine that will do it satisfactorily.

A LARGE PAPER MACHINE.

Perhaps the credit of being the largest paper machine in the world belongs to the twelve-cylinder paper machine in the mill of the Thomson Pulp and Paper Company, at Schuylerville, N. Y. This machine was built by the Pusey & Jones Company in 1893, and embodies features of value and importance which were entirely new, and which could not be found in any machine which had been previously built.

The machine room in which this gigantic machine is now running is 250 feet long and 46 feet 6 inches wide. The floor space occupied, exclusive of driving arrangement located on the machine-room floor, is about 3,300 square feet, and including the driving arrangement is about 5,300 square feet.

This machine is 120 inches wide, and, therefore, if width alone was considered, it is not as large as many other paper machines which have been built. There are twelve forming cylinders 36 inches in diameter, and the total length of the wire-forming surface is 113 feet. A Fourdrinier machine 160 inches wide would have to be provided with a wire 84¼ feet long to equal in superficial surface the wire of the Schuylerville machine.



SMALLEST MACHINE IN THE WORLD.

There are also twelve separate and distinct sets of press rolls (twenty-four in all), each roll being proportioned and constructed to suit the duty which it is called upon to perform, and consequently no two rolls are made alike. In practice it has been found that the theory which led to this construction was entirely correct and confirmed by the results obtained.

There are fifty dryers, 48 inches diameter, 114 inches face, giving a total drying surface of 5,966 square feet, which is certainly not equaled by that of any other paper machine which has been built.

One of the notable features about this machine is that six of the forming cylinders, the primary presses and the main presses are located over the other six cylinders on the second story floor, 8 feet above the main floor.

If the presses and forming cylinders were in a straight line, as is the case in all other instances of which we have knowledge, the total length of the machine would be 275 feet.

THE SMALLEST MACHINE IN THE WORLD.

The smallest paper machine in the world used for practical purposes may be found in the large establishment of the Heller & Merz Company, at Newark, N. J., and was built by the Pusey & Jones Company. The paper used in the beautiful color sample books issued periodically by this enterprising company is made on this small machine.

The machine in question has one forming cylinder 14 inches diameter, 15 inches face; one pair of press rolls, 6 inches diameter, 14 inches face; three dryers, 15 inches diameter, 14 inches face, and occupies, including the driving arrangement, a floor space of 13 feet in length and 5 feet in width.

This small machine has produced 20 pounds of finished paper per hour, at a speed of 25 feet a minute, which is remarkable, and exceeds in this respect the expectations of both the builder and the purchaser.

SPEED IN THE FUTURE.

One of the officials of a company largely engaged in the building of paper machinery recently called his staff into his office and reminded them that in years gone by he had, from time to time, impressed upon their minds the importance of building a paper machine that would make 300 feet of paper per minute. When they had accomplished this, they were appealed to to build machines capable of running 500 feet per minute. At that time 500 feet seemed to be beyond the limit, but he announced that it had also been accomplished, and that a speed of 512 feet per minute had been maintained day after day and week after week, and that a good sheet of paper had been continuously produced at that speed. The official concluded his remarks by stating that in a very short time the twentieth century would be ushered in, and when it arrives it must find the paper machines built by the parties there and then assembled, running at a speed that now seems as unattainable as 500 feet seemed to be two years ago. "The new century," he said, "must find paper machines making sheets of news paper successfully 1,000 feet long every minute."

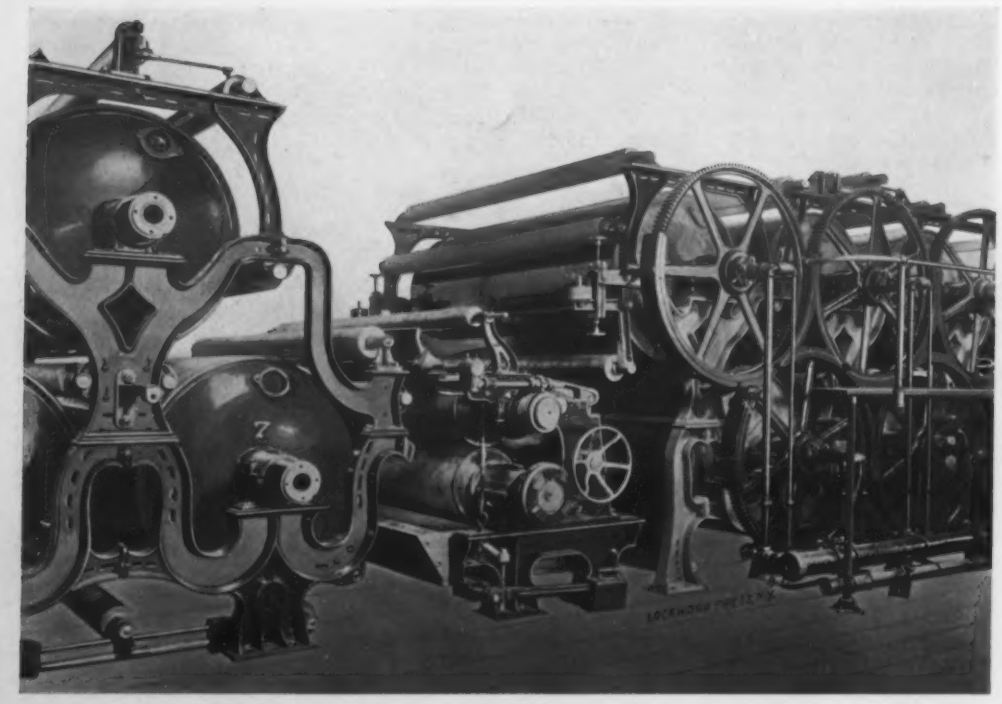
HISTORY OF THE SUNNYDALE PAPER MILL.

IN his article on the development of the American paper machine Mr. Savery refers to the Sunnydale Paper Mill, and in connection with the article four illustrations of the historic structure are given. The first illustration shows the interior of the machine room, Mr. Tempest, the proprietor, being seen standing by the machine. The other illustrations are of the picturesque exterior of the mill.

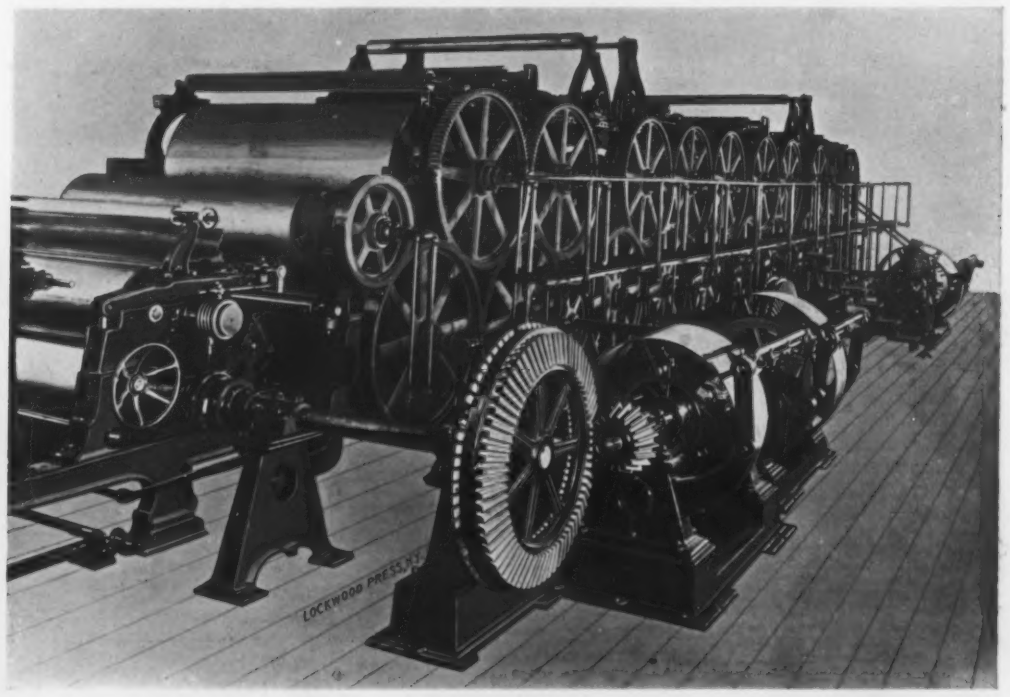
The mill is located in Birmingham Township, Delaware County, Pa., but its post office address is Beaver Valley, Del., the distinction of being situated in one State and of receiving its mail in a neighboring State being one of which not many mills can boast.

The Sunnydale mill is eighty-six years old, having been built in 1811 by John Farra, who operated it as a woolen mill. It ran only a short time as such, however, its career in the textile line being cut short by a fire, which destroyed it. It was rebuilt as a paper mill, and began its historic life in the paper trade as a producer of hand-made goods. On the death of John Farra, his son Daniel succeeded to the business. In 1850 the mill was again burned and was again rebuilt. In 1860 Daniel Farra died, and Francis Tempest then became proprietor. In its early days the mill produced writing and book papers, and had for a watermark the family name of its owner, Farra. The mill is equipped with a 36-inch cylinder machine and two 140-pound engines, and uses both water and steam power.

THE BLACK & CLAWSON CO., Hamilton, Ohio, U. S. A.



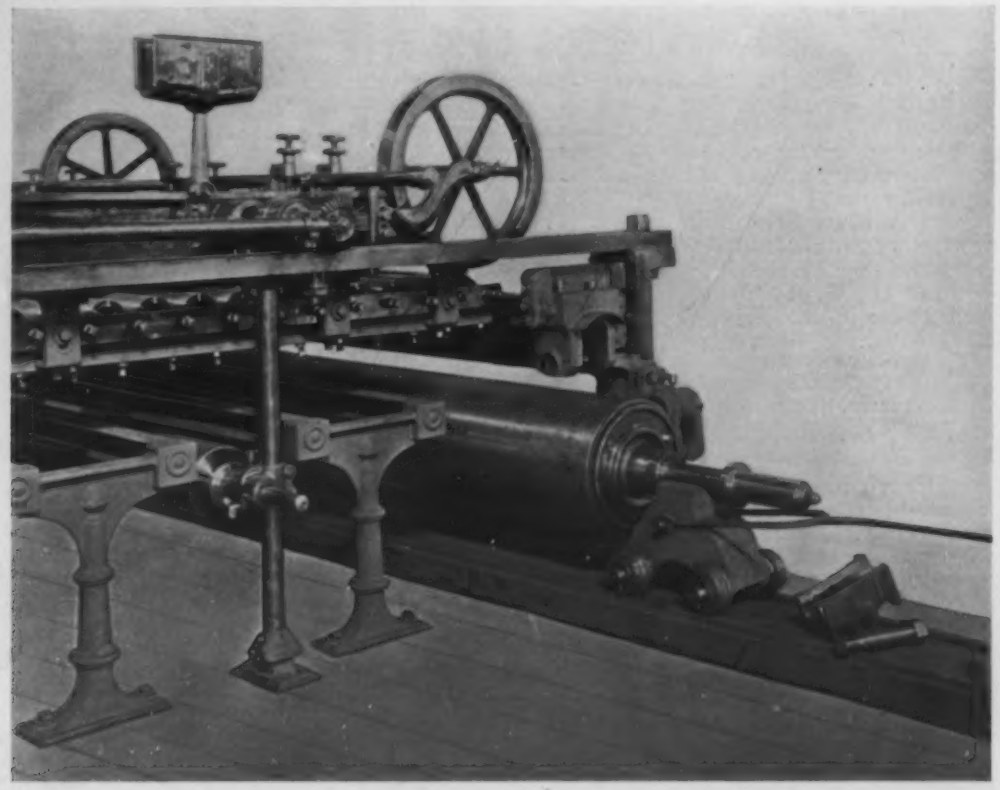
No. 2.
Part view of the Dryers and the Size Press built for the Tokyo Straw Board Co., of Tokyo, Japan, with our Late Attachments and Improvements.



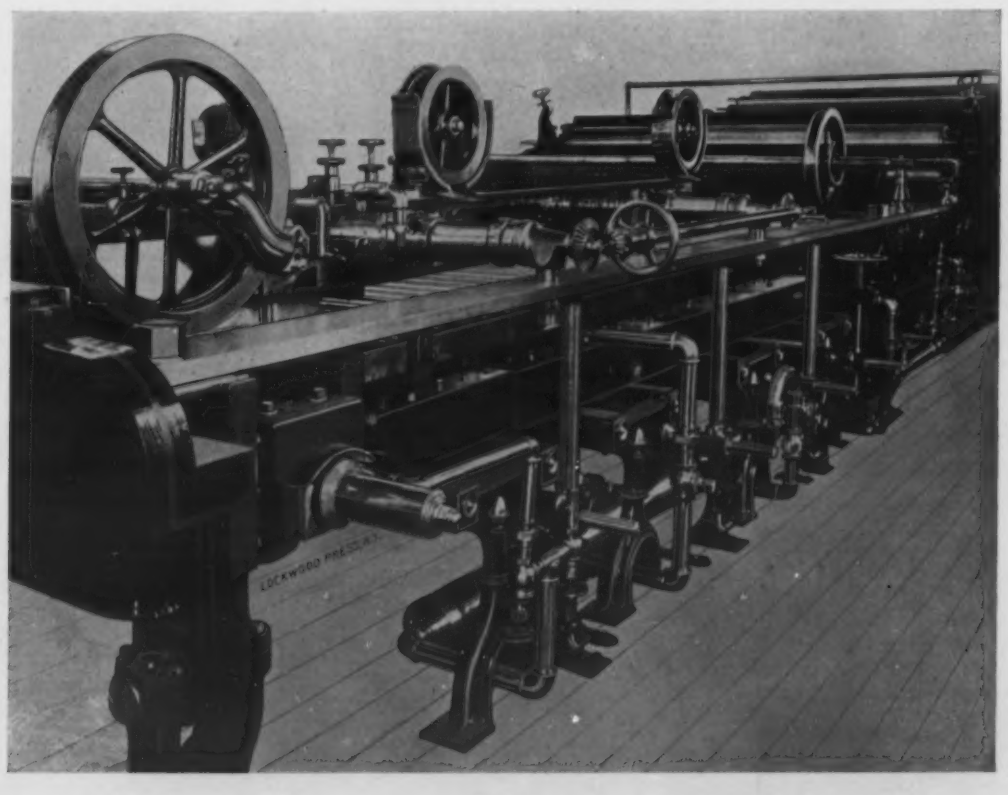
No. 1.
Drive Side of a Stack of 48-inch diameter by 98-inch Face Dryers, made for the Oji Paper Co., of Oji, Japan, with all our Latest Improvements and Attachments.

List of Paper Machines built by the Black & Clawson Co., of Hamilton, Ohio, U. S. A.

Year Machine Was Built.	Name of Company.	Location.	Kind of Machine.
1880	Harding Paper Co.	Franklin, Ohio	76-in. Straight Fourdrinier
"	Republic Printing Co.	Enon, Ohio	62-in. Single Cylinder
1881	Wardlow Thomas Paper Co.	Middletown, Ohio	68-in. Two Cylinder
"	Friend & Fox Paper Co.	Crescentville, Ohio	84-in. " "
"	Perrine Paper Co.	Franklin, Ohio	56-in. " "
"	Newark Paper Co.	Newark, Ohio	
1882	Remington Paper Co.	Agnews, Cal.	66-in. Two Cylinder
"	Tipp Paper Co.	Tippecanoe City, Ohio	72-in. " "
"	Adams & Terry	Monroe, Mich.	56-in. Single Cylinder
"	Xenia Paper Co.	Xenia, Ohio	62-in. Two Cylinder
"	Mead Paper Co.	Dayton, Ohio	56-in. Straight Fourdrinier
"	Oglesby, Moore & Co.	Middletown, Ohio	78-in. Single Cylinder
"	Pennsylvania Pulp and Paper Co.	Lock Haven, Pa.	70-in. Two Cylinder
"	Church & Utley	Rock Falls, Ill.	72-in. Single Cylinder
"	Geo. H. Friend Paper Co.	W. Carrollton, Ohio	74-in. Two Cylinder
"	J. R. Beardsley	Elkhart, Ind.	64-in. Straight Fourdrinier
"	Lafayette Paper Co.	Lafayette, Ind.	72-in. Two Cylinder
1883	Friend & Fox Paper Co.	Crescentville, Ohio	68-in. " "
"	Plain City Paper Co.	Plain City, Ohio	66-in. Single Cylinder
"	Globe Tissue Paper Co.	Elkhart, Ind.	84-in. " "
"	Russell & Andrews	Penn Yan, N. Y.	62-in. Straight Fourdrinier
"	Vandalia Paper Co.	Vandalia, Ill.	{Combination 66-in. Straight Fourdrinier and Two Cylinder.
"	John B. Shepler	Defiance, Ohio	68-in. Two Cylinder
"	Wolverine Car Roofing Co.	Detroit, Mich.	56-in. Single Cylinder
1884	Geo. H. Friend	Lockland, Ohio	77-in. " "
"	Neal Bros. & Brooks	Lockport, N. Y	66-in. Two Cylinder
"	Glass Edsell Paper Co.	Delaware, Ohio	60-in. Straight Fourdrinier
"	Barrett Manufacturing Co.	Augusta, Ga.	78-in. " "
"	Niagara Wood Paper Co.	Niagara Falls, N. Y.	66-in. Three Cylinder
1884	Godfrey & Clark Co.	Pittsburg, Pa.	41-in. Single Cylinder
"	" " "	" "	62-in. " "
1885	Glass Edsell Paper Co.	Delaware, Ohio	40-in. Straight Fourdrinier
"	Standard Paper Co.	Newcastle, Pa.	64-in. Two Cylinder
"	C. L. Hawes Paper Co.	Dayton, Ohio	68-in. Three Cylinder
1886	Harding Paper Co.	Excello, Ohio	62-in. Straight Fourdrinier
"	Vincennes Paper Co.	Vincennes, Ind.	68-in. Single Cylinder
"	Louis Snider Sons Co.	Hamilton, Ohio	86-in. Straight Fourdrinier
"	Gardner Paper Co.	Middletown, Ohio	88-in. " "
"	Middletown Paper Co.	" "	84-in. Harper Fourdrinier
"	Whiteman Paper Co.	Dansville, N. Y.	72-in. " "
"	Haldeman Paper Co.	Lockland, Ohio	44-in. Single Cylinder
1887	Wardlow Thomas Paper Co.	Middletown, Ohio	84-in. Harper Fourdrinier
"	Xenia Paper Co.	Xenia, Ohio	68-in. Single Cylinder
"	Herkimer Paper Co.	Herkimer, N. Y.	94-in. Straight Fourdrinier
"	Rochester Paper Co.	Rochester, N. Y.	72-in. " "
"	Remington Paper Co.	Watertown, N. Y.	62-in. Harper Fourdrinier
"	" "	" "	76-in. " "
"	Kimberly & Clark Co.	Neenah, Wis.	64-in. Straight Foundrinier
"	Coshocton Paper Co.	Coshocton, Ohio	72-in. Single Cylinder
"	Detroit Sulphite Fibre Co.	Detroit, Mich.	80-in. Two Cylinder
"	F. J. Diem & Co.	Dayton, Ohio	68-in. " "
"	Xenia Paper Co.	Xenia, Ohio	68-in. Single Cylinder
"	Parent Paper Co.	Amanda, Ohio	68-in. Two Cylinder
1888	Wm. Morrow	Knightstown, Ind.	66-in. " "
"	Michigan Sulphite Fibre Co.	Port Huron, Mich.	80-in. " "
"	J. Mashima	Tokyo, Japan.	72-in. Four Cylinder
"	American Pulp and Paper Co.	Tiffin, Ohio	88-in. Three Cylinder
"	J. Mashima	Tokyo, Japan	80-in. Straight Fourdrinier

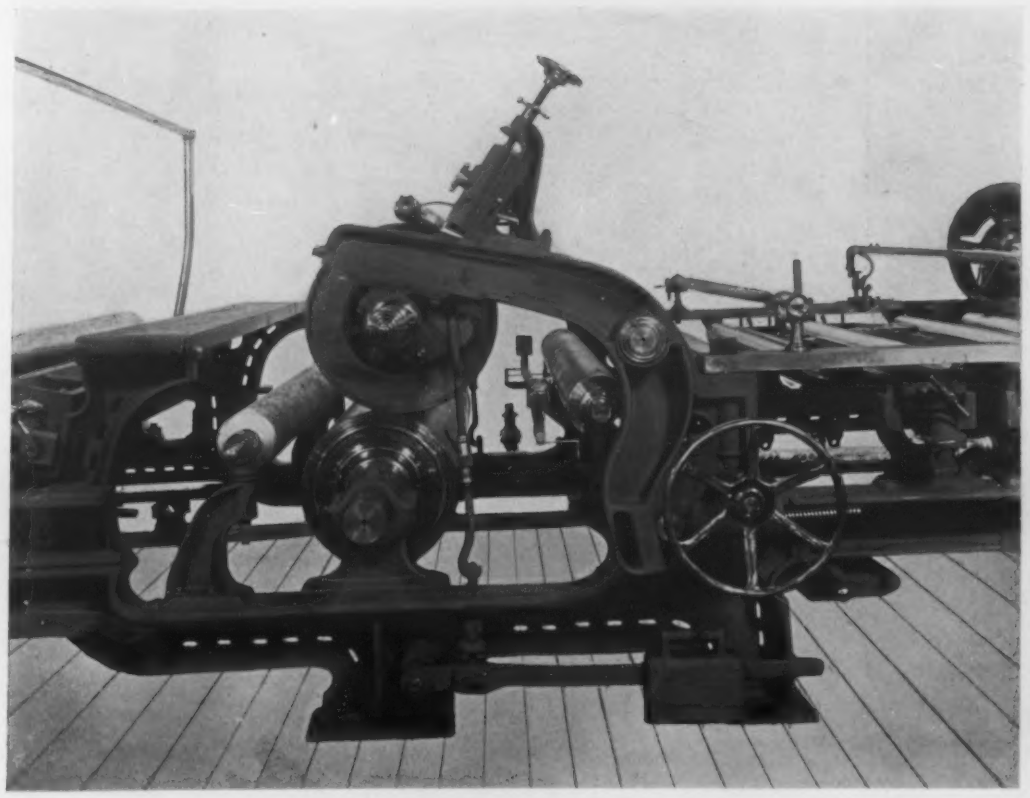


No. 6.
Method of Removing the Breast Roll when Wiring the Machine.

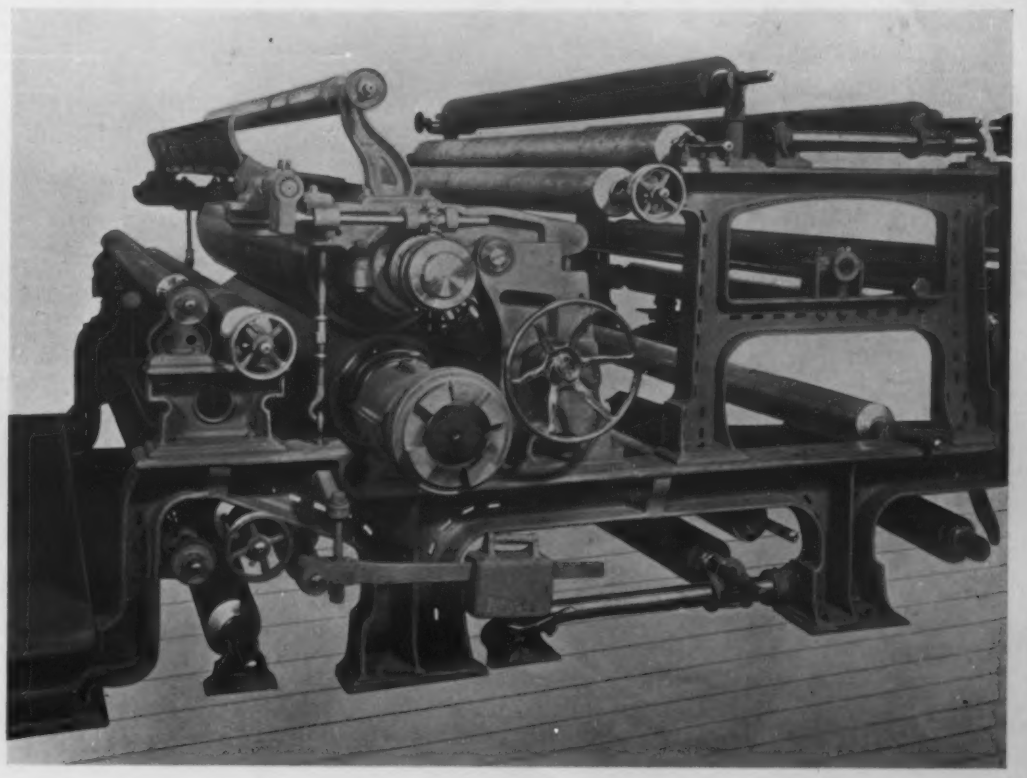


No. 4.
Front side of the Fourdrinier part built for the Tokyo Straw Board Co., of Tokyo, Japan. The wire part is for a wire 50 feet long by 110 inches wide. It has our Improved Stroke and all other Modern Improvements.

THE BLACK & CLAWSON CO., Hamilton, Ohio, U. S. A.



No. 9.
Improved Couch Housings and Arrangement.

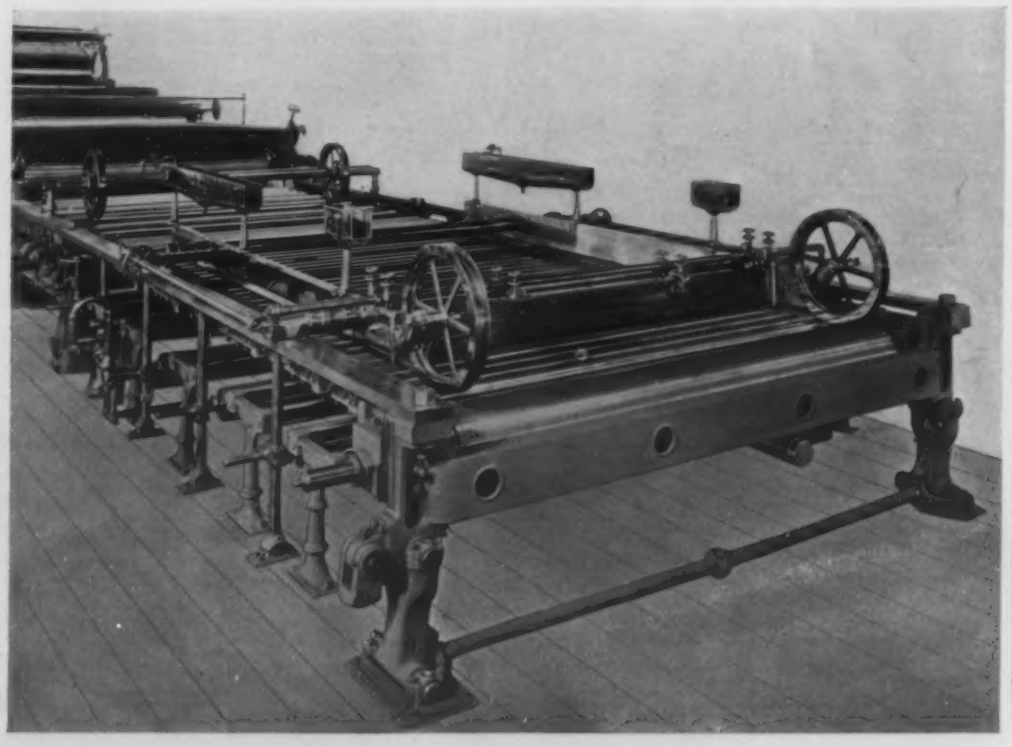


No. 7.
Second Press Arrangement on our Improved Machines, like furnished the Oji Paper Co. and Tokyo Straw Board Co.

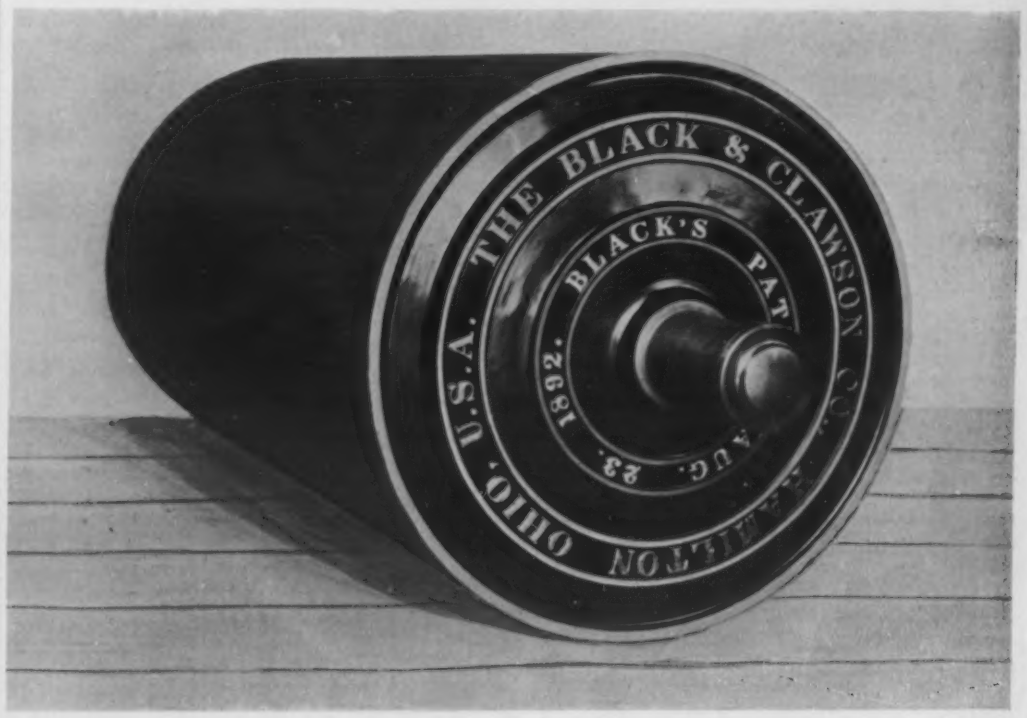
List of Paper Machines built by the Black & Clawson Co., of Hamilton, Ohio, U. S. A.

Year Machine Was Built.	Name of Company.	Location.	Kind of Machine.
1888	Pettebone Cataract Co.	Niagara Falls, N. Y.	84-in. Straight Fourdrinier
"	Bardeen Paper Co.	Otsego, Mich.	80-in. " "
"	Beckett Paper Co.	Hamilton, Ohio	68-in. " "
1889	Diamond Match Co.	Wabash, Ind.	108-in. Four Cylinder
"	Paper Manufacturing Co.	Saltillo, Mexico	40-in. Single Cylinder
"	Sands, McDougal Co.	Melbourne, Australia	88-in. Four Cylinder
"	E. B. Eddy Co.	Hull, Canada	80-in. Two Cylinder
"	Diamond Match Co.	Wabash, Ind.	108-in. Str'ght Fourdrinier
"	Potomac Paper Co.	Cumberland, Md.	86-in. " "
"	Fonda Lake Paper Co.	Watertown, N. Y.	86-in. " "
1890	Oglesby Paper Co.	Middletown, N. Y.	86-in. " "
"	Embossed Lumber and Fibre Co.	New York, N. Y.	74-in. Three Cylinder
"	Niagara Wood Paper Co.	Niagara Falls, N. Y.	72-in. Four Cylinder
"	Gardner Paper Co.	Middletown, Ohio	72-in. " "
"	Herkimer Paper Co.	Herkimer, N. Y.	86-in. Straight Fourdrinier
"	Jefferson Paper Co.	Black River, N. Y.	86-in. " "
"	Manufacturing Investment Co.	Appleton, Wis.	88-in. Two Cylinder
1891	Clinton Paper Co.	Clinton, Iowa	68-in. Single Cylinder
"	D. H. Shartle	Kaukauna, Wis.	68-in. " "
"	Thos. Phillips & Co.	Akron, Ohio	64-in. Three "
"	Peoria Straw Board Co.	Peoria, Ill.	62-in. Four "
"	Illinois River Paper Co.	Marseilles, Ill.	110-in. " "
"	Indiana Pulp and Paper Co.	Marion, Ind.	96-in. Five "
"	Newark Paper Co.	Newark, Ohio	72-in. Single Cylinder
"	Hartje Bros.	Steubenville, Ohio	84-in. Straight Fourdrinier
"	Wisconsin Riv. Pulp & Paper Co.	Stevens Point, Wis.	110-in. " "
1892	Tytus-Gardner P'p'r & Mfg. Co.	Middletown, Ohio	114-in. Str'ght Fourdrinier
"	Robt. Craig & Sons	Airdrie, Scotland	72-in. Four Cylinder
1892	Wisconsin Riv. Pulp & P'p'r Co.	Stevens Point, Wis.	110-in. Str'ght Fourdrinier
"	D. M. Bare & Co.	Roaring Spring, Pa.	84-in. " "
"	Oji Paper Co.	Oji, Japan	98-in. " "
"	Combined Locks Paper Co.	Combined Locks, Wis.	114-in. " "
"	" " " "	" " "	90-in. " "
1893	Peninsular Paper Co.	Ypsilanti, Mich.	78-in. " "
"	John Luke	Denny, Scotland	86-in. Four Cylinder
"	Fuji Paper Co.	Tokyo, Japan	98-in. Straight Fourdrinier
"	Allegan Paper Co.	Allegan, Mich.	56-in. Single Cylinder
"	H. F. Watson Co.	Erie, Pa.	86-in. Four Cylinder
"	McEwan Bros. Co.	Whippany, N. J.	84-in. " "
"	Hagar Straw Board Co.	Cedarville, Ohio	88-in. Two Cylinder
1894	Ohio Straw Board Co.	Urbana, Ohio	102-in. Four Cylinder
"	Hollingsworth & Whitney Co.	Gardiner, Me.	88-in. Straight Fourdrinier
1895	Hans Hanson	Kansas City, Mo.	88-in. Two Cylinder
"	Leon Lauvaux	Labarthe-Inard, France	68-in. Single Cylinder
"	Mullen Bros. Paper Co.	St. Joseph, Mich.	86-in. Two Cylinder
"	Reynolds, Boyle Co.	Jersey City, N. J.	96-in. Four Cylinder
"	Traders Paper Co.	Lockport, N. Y.	104-in. Five Cylinder
1896	E. B. Eddy Co.	Hull, Canada	86-in. Single Cylinder
"	Wm. Barber & Bros.	Georgetown, Canada	72-in. Straight Fourdrinier
1897	Oji Paper Co.	Oji, Japan	98-in. " "
"	" "	" "	" " "
"	Tokyo Straw Board Co.	Tokio, Japan	106-in. Str'ght Fourdrinier
"	S. W. Jones	Yrapuato, Mexico	44-in. Single Cylinder
"	Vincennes Paper Co.	Vincennes, Ind.	68-in. Three Cylinder
"	Fox Paper Co.	Crescentville, Ohio	88-in. Four Cylinder

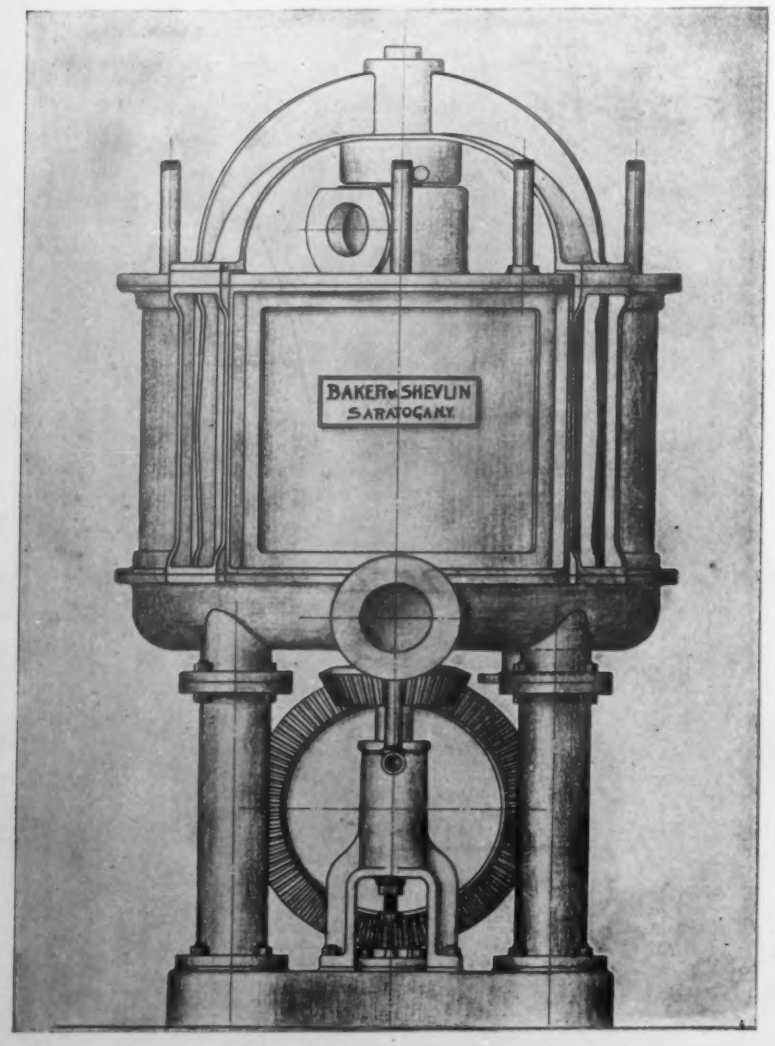
The foregoing list is not a complete one, nor does it include machines that we have rebuilt.



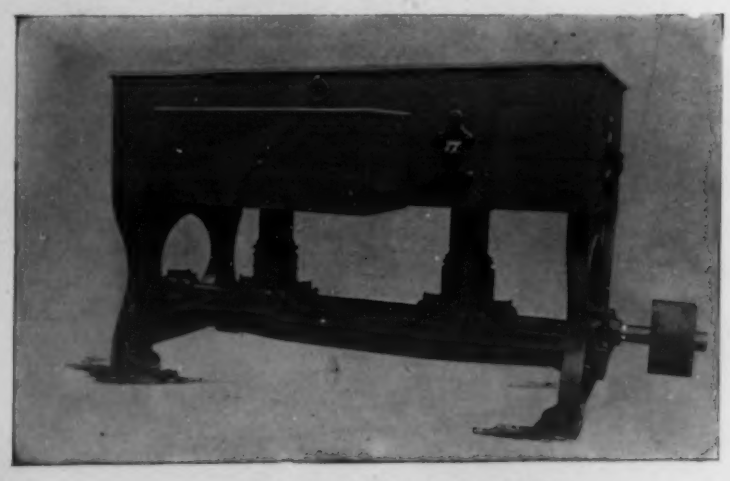
No. 5.
View of the Oji Paper Co., Fourdrinier part, illustrating the shape, arrangement and some of the other details a little more clearly.



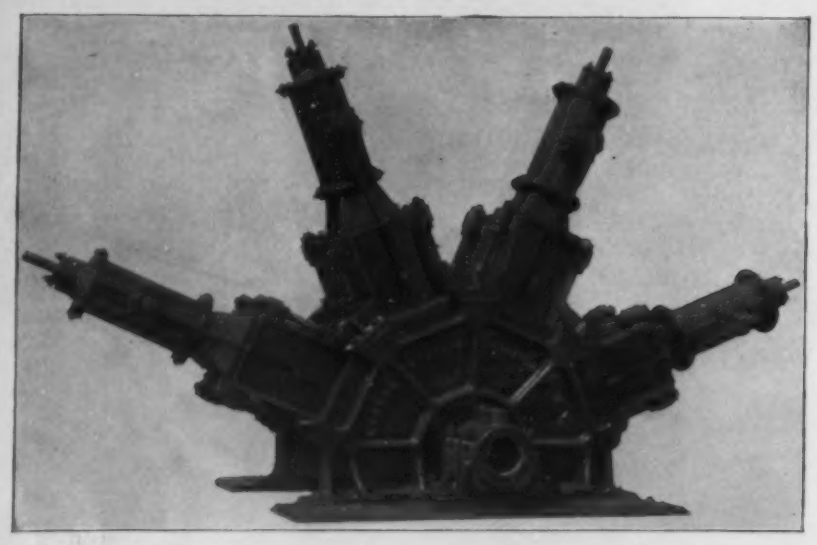
No. 11.
Black's Patent Seamless Dryer, of which we are the Exclusive Manufacturers.



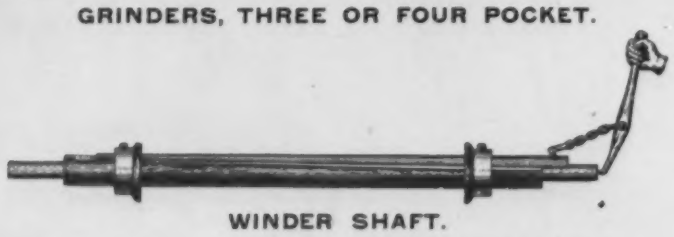
CENTRIFUGAL SCREEN.



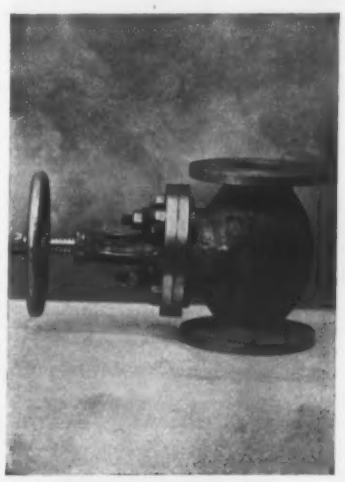
CAM BELLOWS SCREEN.



GRINDERS, THREE OR FOUR POCKET.



WINDER SHAFT.



BRONZE VALVE.

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We build nearly all kinds of Machines used in Paper Mill, Ground Wood or Sulphite Pulp Mill.

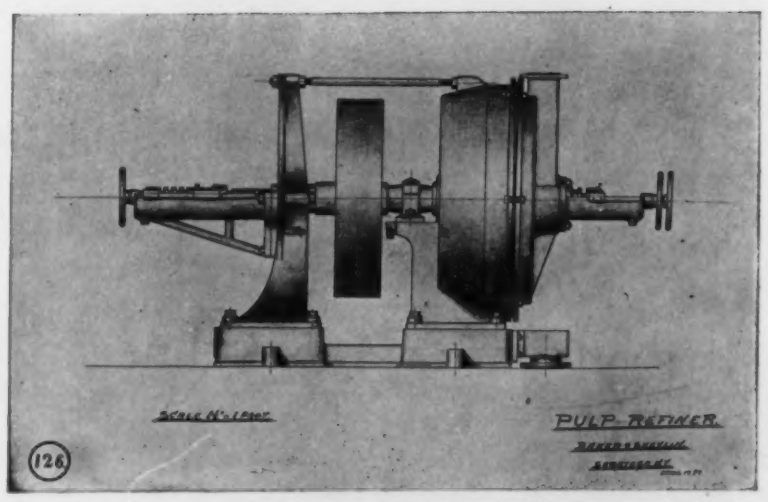
On this page we illustrate a few of them.

We solicit correspondence and opportunity to give estimates.

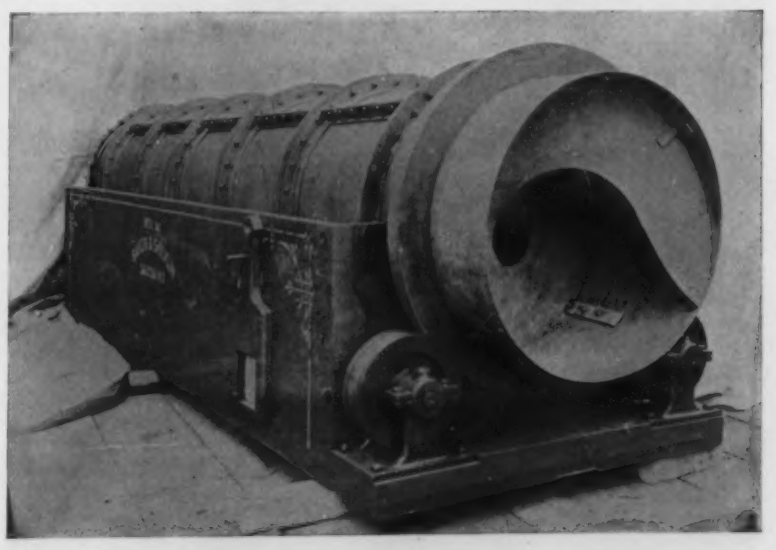
Baker & Shevlin,

SARATOGA, N. Y.

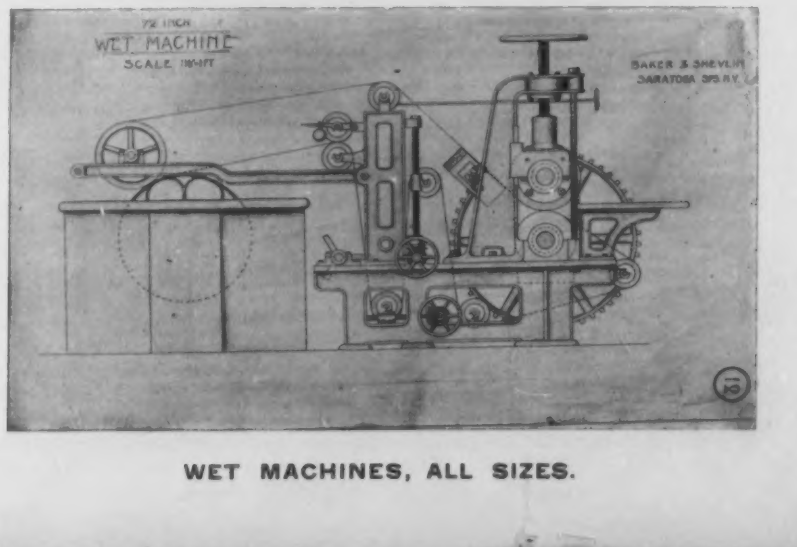
CURTIS PULP SCREEN.



PULP REFINER.



COPPER WASHER WORM.



WET MACHINES, ALL SIZES.

FOURDRINIER WIRE WEAVING.

THE HISTORY OF THE GROWTH OF THE BUSINESS HERE.

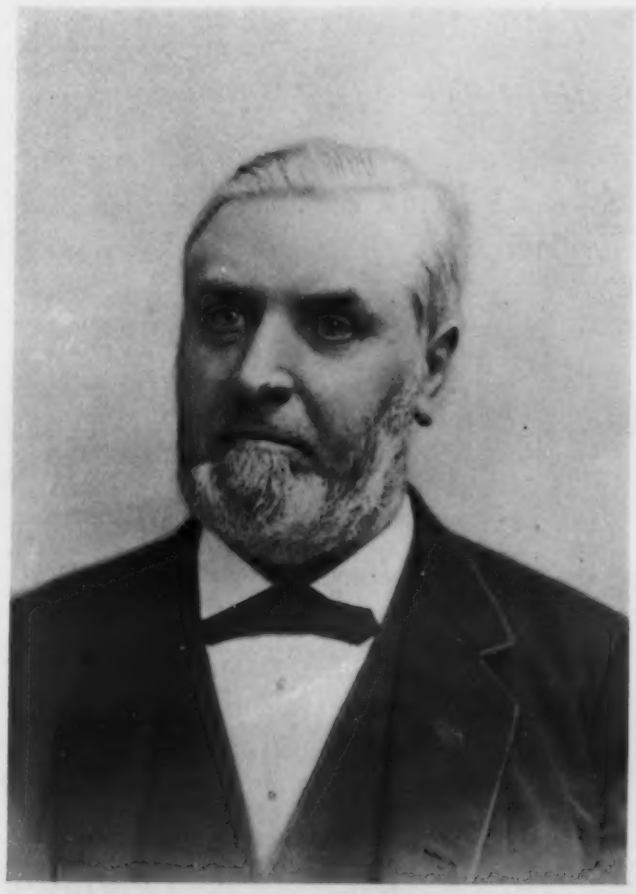
The First Loom to Weave Wire in This Country—The Discouragement Which the Pioneer Wire Weavers Met—The Difficulty of Introducing American Made Wires—The Development and Present Condition of the Trade.

THE manufacture of the Fourdrinier wire in the United States was begun many years subsequent to the introduction of the Fourdrinier machine. Previous to this the wires were specially imported, stocks being carried and orders filled by the paper-commission merchants. The paper machines were not so numerous then nor as large as they are now.

The wire-cloth weavers of New York and vicinity were often appealed to and they tried to fill orders, and some at times succeeded because the machines were small, but the weavers being limited to narrow, single primitive looms, and having no knowledge of the regular broad loom, their efforts were desultory and useless.

Having served an apprenticeship of over seven years at one of the largest shops, if not the largest, in Manchester, England, I was induced by my uncle, who was at Belleville, N. J., with the firm of Stevens & Thomas, to come over for the purpose of manufacturing Fourdrinier wires, which at that time were known as "clothes" in Manchester.

I was under twenty-three years of age. After a packet passage of twenty-one days, I arrived at Belleville, N. J., on May



WILLIAM STANIAR.

27, 1847. I found a factory making brass and copper wire (which, if properly handled, was well adapted to the incipient bantling from the original elements, casting, rolling and wire drawing being carried on, with a poor market for its product, so that when weaving and finishing were added the Fourdrinier wire was absolutely created, which made this factory the only place of such a character in the whole world.

Of course, the first thing to do was to visit the paper mills and the paper-commission houses for encouragement; which we did, with nothing but cold water as the result. The writer does not remember a single instance where the slightest hope of success was held out.

At that time the mills nearly all traded with the commission merchants, who took their goods and supplied all their wants, except cash. Stock, chemicals, wires, felts, etc., were all supplied, and in many instances we were told that there could be a free sale only when the mills could make a side sale "unbeknownst" to the merchants, so that we had an uphill fight. All arts and devices were used to kill off the home-made wire. As a "plumper" the importers shot off the silk-edged wires, as though we could not meet it with red, white and blue, which so many require to this day, and which some decline.

Climate, material, ignorance, inexperience and the excuse that it had been tried before and had failed were all urged against us. We were taunted with the story that some one from London had tried at Newton, Mass., and had failed, and that Americans in New York had repeatedly tried in vain, and consequently it was no use for anyone to try any more. Little encouragement was afforded until manufacturing competition forced the foreign wires out.

The paper machines being narrow, as stated, they were also short, say 28 inches by 26 feet, 36 inches by 24 feet, 38 inches, 40 inches, 42 inches by 23 feet 4 inches, 44 inches, 48 inches, 50 inches by 22 feet 10 inches, with 62 inches, 68 inches and 72 inches seldom, but when we got 84 inches from the Chelsea Mills at Norwich, Conn., we began to feel small.

The loom was made to weave with a man at each side, a complete novelty in this country at that time. The operators were called right and left hand men. They threw the shuttle to each other, the right-hand man doing the treading in addition, which made him the boss of the loom.

The fine wire of which the cloth is composed is a special composition adapted to the service which it is to perform, and anyone who would study its wear and tear as it is made into cloth would think it had done well enough without going onto a Fourdrinier machine.

Connected with this matter there is a curious bit of history. About the year 1840 the writer worked what they termed shifts with three others, with girls working in the daytime; covering a 62-inch Fourdrinier wire all over its surface with the word "Postage" for a watermark, thus apparently demonstrating that at that day they had no idea a simple dandy roll would answer the purpose.

It was understood that this was one of the plans to be adopted to represent in some way the idea of penny postage introduced about that time, but the stamps were adopted.

The writer has spent more than sixty years in his business, and has handled, along with wires, hundreds of cylinders and dandy rolls, the first of which latter he lettered in this country. Four impressions of a sheet 22x24 were taken off and forty-two impressions put in the same space, there being 1,092 letters, some of which (Romans) were not over one-eighth of an inch in size. He has built forming cylinders from 14 inches in diameter to 52 inches in diameter, all of brass, some of the latter of which he completed not long ago.

His business is now carried on by the Staniar & Laffey Wire Company, where the class of goods mentioned are manufactured, the metal being cast and formed as in the factory first mentioned; making two places now where the copper and zinc in separate ingots are changed into a Fourdrinier wire.

It appears to be conceded that the original inventor of the Fourdrinier machine was robbed of the fruits of his genius by at least three other men, and I also understood that the cylinder machine was an American invention. Indeed, it was called by that name in Manchester, England. Such, however, is not the fact. It was invented in England in 1807 by John Dickinson.

I have seen the patent drawings and the full particulars. I think my friend, George West, should know something of this, as it was not far from his neighborhood.

WILLIAM STANIAR.

"THOU hast caused printing to be used, thou hast builded a paper mill," is a true saying.

It might as truthfully be added, "thou hast builded a paper mill; thou hast created a Fourdrinier wire factory," for the growth of the Fourdrinier wire business has gone hand in hand with the development of the paper industry.

The history of the manufacture of Fourdrinier wire cloth in the United States dates back to 1848. Previous to this time all wires and wire cloths for paper mills were imported, although the quantity used was, of course, comparatively small.

Early in 1848 my father, Robert Buchanan, came to America from Glasgow, Scotland, where he had been working for a number of years at Fourdrinier wire weaving.

He located at Jersey City, N. J., and at once commenced to fit up the first Fourdrinier shop in America for a Mr. Van Winkle.

The work was finally completed, a web was beamed on, threaded in the reed, and the first shuttle was to have been thrown the following morning, but when morning dawned the building was in ashes, having burned during the night.

The plant was not insured, and Mr. Van Winkle's loss was so heavy that he did not rebuild.

About the same time William Staniar, for William Stevens & Son, imported a loom about 70 inches wide from England.

William Stevens & Son located their plant at Belleville, N. J., and here was woven the first Fourdrinier wire made in this country, the weavers being John McMurray, who had just come from Scotland, and my father.

Soon after Mr. McMurray left the employ of William Stevens & Sons, and with the Cabble brothers established another Fourdrinier business, which is now the William Cabble Excelsior Wire Manufacturing Company, of Brooklyn, N. Y.

In 1853, when eleven years old, I started to work for William Stevens & Son as a bobbin boy.

About 1853 John McMurray withdrew from the business with the Cabbles and started for himself at No. 301 Pearl street, New York city.

About 1851, during the period of the disastrous panic, William Stevens & Son failed, and William Staniar, who had continued with them, made a new start in the business at Belleville, but later moved to East Newark, N. J., where the business is carried on yet, the business name now being the Staniar & Laffey Wire Company.

After the failure the factory was closed for several months, and my father removed to Georgetown, Conn., where we worked for Gilbert & Binnett, weaving screen cloth and iron wire cloth.

I worked there for several months, and then continued my apprenticeship at Fourdrinier wire weaving, which I had commenced with Wm. Stevens & Son, at the shop of John McMurray, later returning to Belleville and completing apprenticeship with the De Witt Wire Cloth Company, which had in the meantime reorganized and started the business, and it has since been carried on by the De Witt Company. Owing to these changes I was obliged to serve seven years at my trade.

I had just finished my apprenticeship when the war broke out, and was one of a number of the employees of the De Witt Company to go to the front. I joined the navy and served on the United States steamer Matabassett.

At the close of the war I returned, and remained with the De Witt Wire Cloth Company until 1876, working for several years at my trade and afterward as foreman, which position I held until 1876, when, with Chas. Smith, I established the Standard Wire Works at Bloomfield, N. J.

My father and my brothers, Andrew and James, who had been employed by the De Witt Company, left at the same time and removed to Boston, Mass., where they started Morss & Whyte in the Fourdrinier business.

They soon went to Holyoke, Mass., and established the Holyoke Wire Works.

John Bolt was soon afterward admitted to the company, and the firm name became Buchanan, Bolt & Co., under which title the business has since been carried on until recently incorporated, it now being the Buchanan & Bolt Company.

Thus the two weavers who wove the first Fourdrinier wire became proprietors of shops.

Robert Buchanan died about three years ago, and Andrew, his son, expired very suddenly last summer while at work at the factory.

Mr. Bolt alone of the original partners is now identified with the business.

In 1877 John Eastwood, of Belleville, N. J., was admitted as a partner in the Standard Wire Works. A new building was erected at Belleville, and the business was removed there the same year, the firm name being changed to Eastwood, Buchanan & Smith, and later to the Eastwood Wire Manufacturing Company, and so continues.

In February, 1882, I severed my connection with the Eastwood Wire Manufacturing Company and removed to Springfield, Mass., entering the employ of the Cheney-Bigelow Wire Works as foreman of their Fourdrinier department, and remained with them until March, 1896, when I removed to Appleton, Wis., and with my sons, G. E. and J. R., and my brother-in-law, A. B. Weissenborn, who was foreman of the wire-drawing department of the Cheney-Bigelow Wire Works for a number of years, established the Appleton Wire Works.

Several smaller Fourdrinier shops have branched out from those mentioned, some of which have failed, while others are now running.

It can, therefore, truthfully be said that the firm of William Stevens & Sons was the parent of nearly all of the Fourdrinier shops in the country to-day.

When I first became identified with the Fourdrinier wire business there were only two or three small shops, having all told less than ten broad looms, while there are to-day several shops having two or three times this number of looms each.

From this small beginning I have seen the industry develop

WILLIAM BUCHANAN.

until there are now about fifteen Fourdrinier wire manufacturers, having from twenty-five to thirty looms down to two or three.

The total number of broad looms in the United States is about 200, nearly all of which are busy the year round turning out Fourdrinier wires, cylinder covers, dandy covers and washer wires to supply the hundreds of paper mills from the Atlantic to the Pacific and from the Gulf to the Great Lakes, and in fact beyond the Great Lakes, as quite a number of wires are exported to Canada and some also to Great Britain, Japan and Mexico.

A few wires are imported from Great Britain and France, but in comparison to the number used the per cent. is exceedingly small.

Of these 200 looms over forty have been built under my personal supervision while foreman and proprietor of the several shops with which I have been connected.

The names of the Fourdrinier manufacturers and the location of their plants are as follows:

New England—Cheney-Bigelow Wire Works, Springfield, Mass.; Buchanan & Bolt Wire Company and Brown & Sellers, Holyoke, Mass.; Thistle Wire Company, Lee, Mass.; H. & T. McCluskey & Sons, New Haven, Conn.

Middle States—Wm. Cabble Excelsior Wire Manufacturing Company, Brooklyn, N. Y.; De Witt Wire Cloth Company and Eastwood Wire Manufacturing Company, Belleville, N. J.; Alfred Workman, Kearney, N. J.; the Staniar & Laffey Wire Company, East Newark, N. J.; Lewis Wire Works, East Newark, N. J.; Thomas Gleason, Harrison, N. J.

Central States—Reed Wire Works, Newark, Ohio; W. S. Tyler Wire Works, Cleveland, Ohio. While the Appleton Wire Works, Appleton, Wis., are the only Fourdrinier manufacturers west of Ohio, there may be one or two small shops not mentioned.

Forty years ago the wires averaged from 50 inches to 60 inches wide.

Between 40 inches and 50 inches was a fair width, while a 36-inch Fourdrinier was not unknown, and 24 feet 10 inches was a popular length.

A wire over 72 inches wide by 35 feet long was considered large, while a 40-foot wire was exceptional.

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THOROUGH INSPECTIONS

And insurance against loss or damage to property and loss of life and injury to persons caused by

STEAM BOILER EXPLOSIONS.

Had the manufacturers of the fifties been told that before the close of the century a machine requiring a wire 162 inches by 60 or 65 feet and running 400 feet a minute would be built and run successfully, such a visionary mortal would have been considered in the bosom of his family if seen with Ananias on one side and Sapphira on the other, if not a fit subject for an insane asylum.

However, this is now a reality, and such a machine, requiring a wire of this size, is now running at the Rumford Falls Paper Company, Rumford Falls, Me.

The longest wire of which I know, and probably the longest in the world, is used by the Niagara Falls Paper Company, Niagara Falls, N. Y., being 72 feet long by 136 inches wide.

To meet the changed conditions of increased speed, quality and preparation of stock, larger percentage of clay and ground wood, etc., the Fourdrinier manufacturers are constantly studying wherein the wires may be improved that they may give satisfactory service, for, as may be imagined, wires to-day are being subjected to more severe tests than ever before.

I have sometimes heard paper manufacturers say they wish they could obtain as good wires as they did years ago.

However, I believe, were some of those wished-for wires, which doubtless did give excellent service under the then existing conditions, put onto the greyhounds of to-day with changed conditions they would often be found wanting, and there would be weeping and wailing and gnashing of teeth, while the wires would be cast into outer darkness—or elsewhere.

During the past two or three years the Fourdrinier wire manufacturers have not generally been obliged to burn much midnight oil to fill orders, but several of us have a few barrels which we would not be loath to consume.

From present indications the paper industry and therefore the Fourdrinier and allied trades will soon feel the rising tide of returning prosperity, and we have reason to believe that the good old days of a few years ago will soon again be a reality instead of a memory. WILLIAM BUCHANAN.

William, Joseph C., Edward and Elijah Cabble came from England in 1843. They were all skillful and practical workmen. Going to Belleville, N. J., they entered the employ of William Stephens & Son, and remained there for several years.

In 1848 they returned to New York, and William formed a partnership with David Woods, and they established a wire factory at Hester and Elizabeth streets, Joseph C., Edward and Elijah being in the employ of the new firm as journeymen.

The partnership between William Cabble and David Woods lasted until 1854, when Mr. Woods retired, and in the same year William Cabble removed the business to Brooklyn, where it has remained ever since, and where it has grown to immense proportions.

William Cabble died in 1870, and after his death the surviving brothers formed a stock company. Since then Joseph C. and Edward Cabble have died, and now Elijah Cabble, the youngest of the four brothers, is at the head of the business, being the president and general manager of the company. It is interesting to note that the first paper machine operated in Japan used an American wire, it being made by the William Cabble Excelsior Wire Manufacturing Company.

A Few Early Patents.

Up to 1800 only four patents in the paper line were granted by the United States Patent Office.

The first patent granted in this country in this line of industry was that to John Carnes, Jr., whose address is not recorded. It was for a paper mould, and was granted April 11, 1793.

The second was to John Biddis, of Pennsylvania, to whom letters patent were issued on March 31, 1794, for a paper machine.

On December 4, 1798, Cyrus Austin, of New Jersey, was granted a patent for the manufacture of paper, and on October 28, 1799, Robert R. Livingston, of New York, was granted a patent for paper manufacturing.

ALBERTO PAGENSTECHER.

GROUND WOOD.

THE STORY OF ITS INTRODUCTION TO THIS COUNTRY.

How the Article Was Discovered by Keller—The Grinder Invented by Voelter—The First Machines in This Country—The Curtisville Mill—The Voelter Patents and the Attempts to Evade Them—The Growth of the Industry.

BY A. PAGENSTECHER.

IMPORTANT discoveries are frequently made by men who do not derive any material benefit from their discoveries, and sometimes even their names are forgotten. The men who succeed in making such discoveries commercially valuable, in constructing machines and apparatus, and who take out patents to protect their inventions, acquire both material benefit and fame.

The name of Professor Gauss, of Goettingen, is known to very few people as a man who operated an electric telegraph in his native town as early as 1833, while the name of Professor Morse is known to everybody as the successful inventor of apparatus for transmitting electric signals, for which he took out his first patent in this country in 1837, and whose system and instruments are still employed in the United States, Canada and several European countries.

A. PAGENSTECHER.

A similar relation exists between Friedrich Gottlob Keller, the discoverer of wood pulp, and Henry Voelter, the inventor of the best machine to produce it. Very few of the fraternity of paper makers have heard the name of Keller, while they all know the name of Voelter.

How Keller made the discovery is interesting. While strolling through a forest he found a deserted wasp's nest, and examining it discovered that it was composed of small fibres of wood knitted together like coarse wrapping paper. After some crude attempts to reproduce such fibre by rubbing wood on a stone he communicated with Henry Voelter, a paper maker and practical machinist, who constructed a machine and invented a process of grinding it, which are known by his name wherever wood pulp is made.

INTRODUCTION OF WOOD PULP TO THE UNITED STATES.

The introduction of the Voelter machine and process of grinding wood into the United States, in which I became interested, is the subject of this article.

In the summer of 1866 I discussed with my cousin, Alberto Pagenstecher, who had made some money in South America building railroads, the subject of an investment in this country. A friend of ours, Theodore Steinway, of the well-known piano-manufacturing firm, had mentioned to him that paper was being made in Germany out of wood, and as my brother Rudolf was at that time in Germany correspondence on the subject was opened with him, and after investigation it was decided to import two machines for grinding wood pulp, and to engage a competent man to set them up and start them. A water power was secured at Curtisville, near Stockbridge, Mass., and the construction of the mill building commenced. The two machines arrived in December, 1866, in charge of Frederick Wuertzbach, who went immediately to work to set them up. The first pulp was made on March 5, 1867. The Smith Paper Company, the paper mills of which are located only a few miles from Curtisville, consented to use the pulp, and on March 8, 1867, the first trial was made at its mill. The trial proved entirely satisfactory and induced the company to contract to use every pound manufactured at Curtisville, and for more than a year that concern enjoyed the monopoly of using this new raw material, keeping the knowledge entirely to itself. To Hon. Wellington Smith and the Smith Paper Company therefore belongs the honor of having used the first wood pulp successfully in this country. Mr. Wuertzbach, who was the first pulp maker in this country, is now superintendent of one of the Smith Paper Company's pulp mills.

During the summer of 1868 I stayed with my family in Stockbridge, and had a chance to become thoroughly acquainted with the process of pulp making, and was very much impressed with the importance of the new material, and with the simplicity of its manufacture. When, therefore, we received a notice from Louis Prang, of Boston, who was Mr. Voelter's American agent, that the machines which we had imported from Germany were an infringement on a patent taken out in this country by Mr. Voelter, I immediately induced my cousin and my brother to buy the patent on joint account. This was done in the autumn of 1869. I then tried to interest paper manufacturers in this country in this new process, but I got no encouragement from them, and one of the most prominent men in the trade told me "Mr. Pagenstecher, we shall not take an interest in shoddy." Mr. Prang had also tried to interest paper makers, especially those whose mills produced news paper, in the new product, but he was told that as the profits in making news paper were ample there was no need of introducing the then called "inferior stock."

It is a remarkable fact that none of the American visitors to the World's Exposition in 1862, and in Paris 1867, where Mr. Voelter had exhibited full working plants, had noticed this invention, which was going to revolutionize the paper making of the whole world.

EARLY WOOD-PULP MILLS.

We succeeded, however, in interesting some other people, mostly not paper makers, and several small mills were started in 1868 and early in 1869 in Lawrence, Fitchburg and Lee, Mass., Norway, Me., and Lanesville, Conn., and, besides, we bought another water power at Luzerne, N. Y., and started a mill on our own account. This mill in Luzerne was the first mill using pulp machinery made in America, and this mill became the starting point of the Hudson River Pulp and Paper Company. All of these early mills were located on small water powers, which later on could not compete with the larger mills, and have not proven a profitable investment.

Through the mill in Lawrence, started by Mr. Maynadier, a friend of Alberto Pagenstecher, Hon. William A. Russell became acquainted with the value of this new material, and he immediately saw the importance of becoming interested in it. He obtained the right to build two large pulp mills, one in Franklin, N. H., and one in Bellows Falls, Vt., and afterward bought the rights for the New England States, excepting such licenses as had been previously granted.

At about the same time I made the acquaintance of Hon. Warner Miller, who took an interest with us in the rest of the territory, and a large mill at Palmer's Falls was immediately planned and the construction begun.

Alvah Crocker, of Fitchburg, had also secured the rights to build a large pulp mill at Turner's Falls, which was later on merged into the Montague Paper Company. So the year 1869 marks the starting point of most of the large mills which to-day are still in successful operation.

It is well to pay a tribute here to Mr. Russell and Mr. Miller for their effective co-operation to maintain the patent and keep the new industry in a flourishing condition. My cousin returned to Germany in 1870 for family reasons, and as my brother was attending to his legitimate export business it left the management of the pulp business entirely in my hands. With the help of the two friends named I succeeded in surmounting many obstacles, and everybody prospered who took an interest under our management of the patent.

The Voelter patent expired in 1870, but the inventor had no trouble in having it extended for another seven years, up to 1877. In that year we succeeded in extending it again, through act of

RUDOLF PAGENSTECHER.

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3d.—Will work perfectly on all kinds of stock; has no equal for screening sulphite pulp.

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5th.—Light running, small amount of power required. We have screens working over six months that have not had a wrench on them to make the slightest adjustment.

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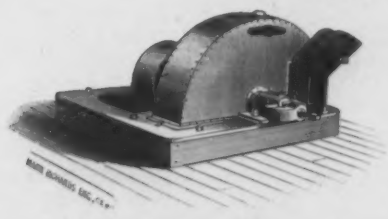
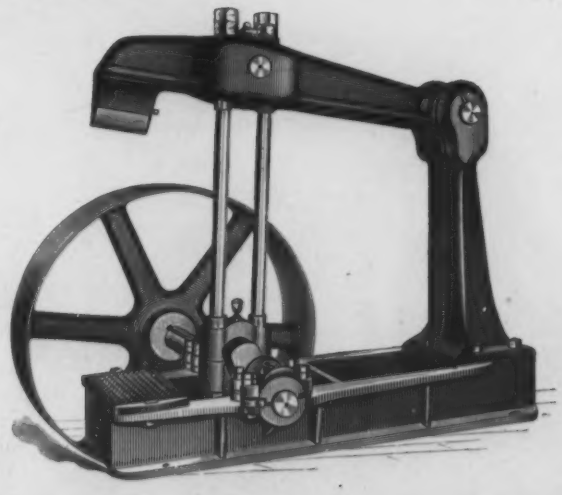




Congress, another seven years, up to 1884, when it expired and became public property.

ATTEMPTS TO EVADE THE PATENT.

In the early days there were numerous attempts to evade the Voelter patent, many of which were made under a misapprehension as to its scope. Some people had the impression that the patent was on the use of a grindstone in making wood pulp, and attempted to substitute emery wheels, steel cutting wheels

HENRY VOELTER.

and other devices, but the patent really covered the process of grinding the fibre off the side of the wood, which is the only practical way, as it is the only one that leaves the fibre with an appreciable length. Other efforts were made in the direction of grinding the end of the wood, and still others were in the direction of grinding the wood quartered, but the results were valueless from a paper-making standpoint. In fact, the inventor, Voelter, had experimented with this process for fully ten years, and had found that there was only one practical way for grinding the pulp, and that was by cutting the sides, and that was the way he patented. The process had been used for ten years in Germany, but apparently nothing was known in this country of it. Sulphite pulp, in the same way, was used in Germany for fifteen years before it was manufactured successfully here.

The introduction of wood pulp was not an easy matter during the first years, as there was a decided prejudice against its use, but when we once got to making paper ourselves from the pulp which was difficult to dispose of, the process was an assured success.

Ground-wood pulp was first sold at 8 cents per pound, but soon dropped to 4 and 5 cents, at which figures it remained for a long time. From that it gradually fell until it got down to 1 cent a pound and less. It brought the price of news paper down from 14 cents in 1869 to 2 cents and less in 1897.

The first mill, at Curtisville, produced about half a ton per day, and its product was pressed into cakes by hand presses and shipped in barrels to the Smith Paper Company. When the Luzerne mill was built it was found impracticable to press the wood in cakes, and Hon. Warner Miller suggested that it be run over a wet machine. He began that system of putting the pulp on the market.

Wood pulp has not only revolutionized the whole paper industry, but it has also changed the publication of newspapers completely. It has made fast-running presses possible, and the large editions issued every day would be entirely out of the question if we had to go back to the old way of making paper out of rags. To-day the output is about 3,200 tons, and the industry has become one of the most important in this country.

In 1728 a patent was granted by the Massachusetts general court to a company for the sole purpose of manufacturing paper, for a term of ten years, on condition that there should be made 115 reams of brown paper and sixty reams of printing paper in the first fifteen months; fifty reams of writing paper in addition to the above in the second year; and twenty-five reams of a superior quality of writing paper in addition to the foregoing in the third and every year thereafter, and that the total annual product of the various qualities should not be less than 500 reams a year. In 1770 Christopher Leffingwell, who began to make paper at Norwich, Conn., in 1768, under the official encouragement of 2d. a quire on all good writing paper and 1d. a quire on all printing and common paper, received a bounty on 4,020 quires of writing paper and 10,600 quires of printing paper, after which the government patronage was withdrawn.

WEST VIRGINIA MILLS.

A Methodist Preacher Founds the Industry in That State.

A pioneer Methodist preacher named Lamden was the proprietor of a paper mill built at Wheeling, on the Ohio River, in 1830, and it was the first paper mill in what is now known as West Virginia. His son, Christopher, had learned the trade of paper making in the old mill at Steubenville, Ohio, when only hand-made paper was produced there. When his apprenticeship ended, Christopher went to Massachusetts for a time in order to see some of the early machines. He then returned home, and it was due to his persuasion that his father built the mill. The machine in it was made by William White.

The Lamdens made tea and wrapping paper, and found a ready market for their goods. In 1835 the mill was burned, but it was rebuilt in the following year, and was then known as the "Virginia" mill. It afterwards passed into the hands of D. Cushing, who made bonnet boards, and, later, wrapping paper.

In 1832 the "Fulton" mill was built by Alexander Armstrong, Archibald Fisher, Joseph Morrison and Frederick Trendley, the last named being the practical paper maker. He was superintendent of the mill for ten years and then sold his interest to another paper maker who was superintendent for four years. He in turn sold his interest to R. Crowl, who, with the Armstrongs, ran the mill for seven years longer.

Mr. Crowl then sold out to the Armstrongs, who after operating the property for a time sold it to Levis, Little & Co., and later Mark Levis ran it alone. It was then purchased by a Mr. Baker, who after an experience of six weeks leased it to Spence & Hanna.

The mill was run on both fine and printing papers, its daily capacity being about 1,500 pounds of news paper.

In 1875 West Virginia had five other mills, Eyster & Son owning another "Virginia" strawboard mill at Halltown, Ashton, Walker & Co. a strawboard mill in Shepherdstown, W. H. Harvey a straw wrapping mill, Harvey, Grimes & Co. a manilla mill at Wellsburg, and Wagener & Co. the "Buckeye" straw wrapping mill at Wheeling.

Now Eyster & Son operate their "Virginia" mill, the West Virginia Paper Company has a large plant at Piedmont, and the S. George Company has a manilla plant at Wheeling, where is also located the Harvey Paper Company, while the "Buckeye" mill at West Wheeling is operated by David Wagener.

Pulp manufacturing is quite an important industry in West Virginia. The mills at present in operation are the West Virginia Pulp Company, the Potomac Pulp Company, the Harper's Ferry Paper Company, the Shenandoah Pulp Company and the Piedmont Pulp and Paper Company, the last named being by far the largest concern.

WHAT A "DANDY" DID.

Why the Paper Was Confiscated.

Early in 1861 two men, who were then well-known paper manufacturers in Lee, Mass., called on a manufacturer of dandy rolls, whose office was then in John street. They gave a general description of a "dandy" which they wished him to make, and inquired as to the cost. The price was fixed at $125, which the paper manufacturers agreed to pay. They then left, promising that when they returned to Lee they would send the design and lettering for the roll.

They did so, and the wire manufacturer was instructed to put the letters C S A on the roll. He did so, and shipped it to Lee.

The lettering was so suggestive that the United States Treasurer was informed of it. He at once put detectives on the case, and shortly afterward several carloads of paper made over this dandy roll were confiscated, and the Confederate States of America failed to get the goods which they had ordered.

After the capture the United States Treasurer in Washington sent a letter of thanks to his informant, and later on the Confederacy went out of business. All of the people interested in the papermaking part of the transaction are now dead, and the story now for the first time appears in print.

CURTISVILLE WOOD-PULP MILL—THE FIRST GROUND-WOOD PLANT IN THE UNITED STATES.

OLD-TIME VAT MEN.

Reminiscences by Hon. Byron Weston.

The Hon. Byron Weston, a few years ago, in speaking of the early days in paper making, said that the paper makers of the old vat mills could always be distinguished from workmen in other industries by their abnormally large red hands, which were the result of having to continually dip their hands in the warm

FREDERICK WUERTZBACH.

water and pulp. Another distinguishing characteristic feature of these men was their round shoulders, due to their continual bending over the vat. These men, in great measure, he said, were of a nomadic disposition, not, however, like the tramps of to-day, for the roaming paper maker had no vices which made him a social outcast. He wandered about the country, going from mill to mill, and was assisted by his fellow craftsmen until he found such employment as suited him. There he remained for a time, apparently satisfied, until some trivial dispute arose or some whim of his own again aroused his restlessness and led him to start again on his travels. In recent years the roaming paper maker had become a comparatively rare bird, and nowhere was he now found loitering around the mills. Of course, many paper makers of the olden times had steady work, as have their successors now, and among the former Governor Weston mentioned James Wilson and James Reed, both of whom lived in Dalton.

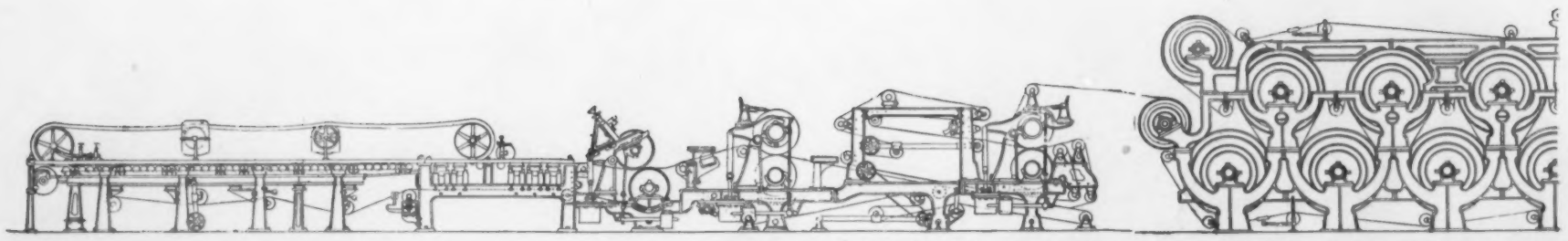
In the early days of paper making it was regarded as a great accomplishment to be a good vat man. He who could hold level a moulding box with its fibre and water, and thus make a perfect sheet of paper of uniform thickness, was held in high esteem. In those days the men in the mills began work early in the morning or shortly after dawn, stopping for breakfast and again taking a rest at grog time, which was about 11 o'clock in the forenoon. A full day's work was twenty "posts." This was generally finished early in the afternoon, and then the men generally frequented the village tavern to talk politics, horse races and other topics of the day.

Most of the banks and some of the business houses at that period owned their own moulds and watermarks, so that when paper was needed by them the mould was sent up to the mill, the paper made from it, and then the mould was returned to be kept by its proper holder under lock and key until it was again wanted for further use.

The paper-mill buildings of those days and their equipment were simple and unpretentious. About all that seemed to be needed was a shed-like structure with sufficient water power to run an overshot water wheel and an engine in which the rags were beaten to pulp, while the rest of the outfit consisted of the vat out of which the pulp was dipped, felts, a screw press to discharge the water, a tub into which the paper was dipped in sizing it, some poles on which to hang the paper to dry, and a loft room where the paper could be hung. From the general use of the latter came the trade term of "loft dried," which survives to this day. The paper made was rough of surface, was deckle edged, and dark in color.

Munsell's "Chronology" states that Thomas Amies, of Philadelphia, made a quantity of paper for printing the Declaration of Independence. The moulds and felts were specially made, the size of the sheet was 26 x 36 inches, the stock was the finest linen rags, each ream weighed 140 pounds, and the price was $125.

PAPER-MAKING



SIDE ELEVATION OF 137-INCH FAST-RUNNING FOURDRINIER FOR
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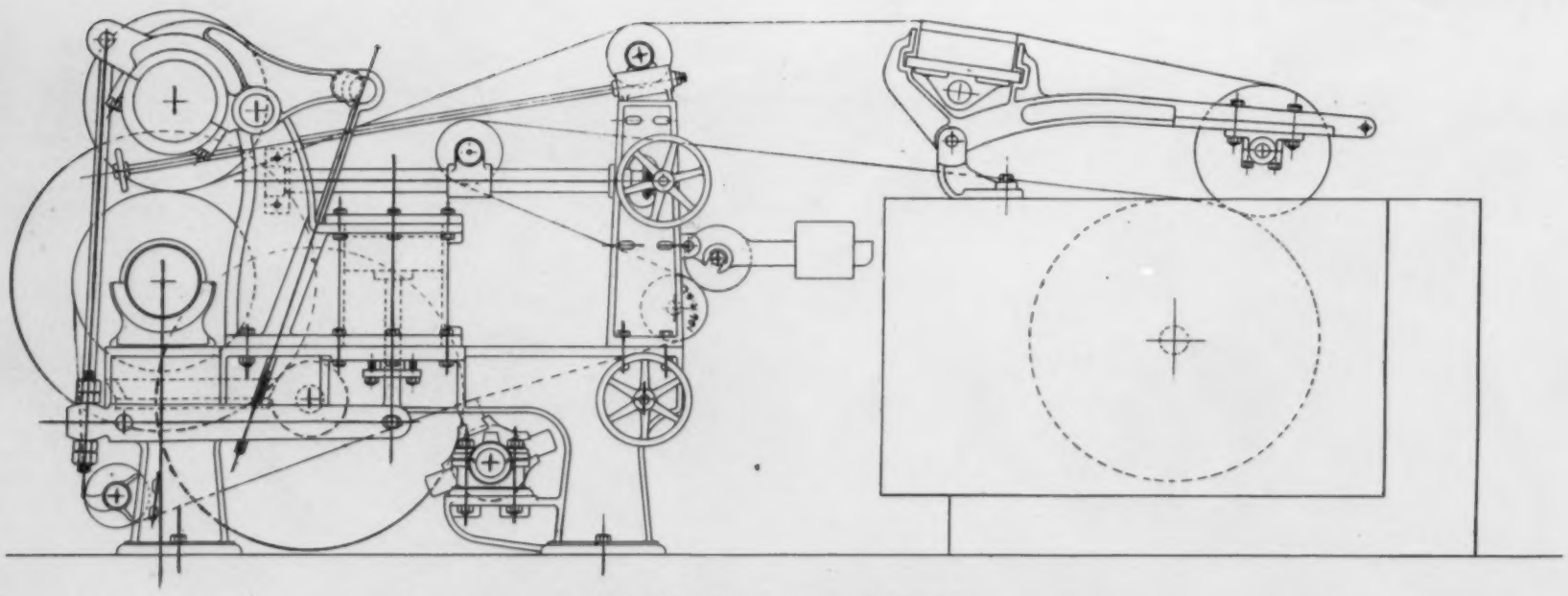
THE BAGLEY

Watertown,



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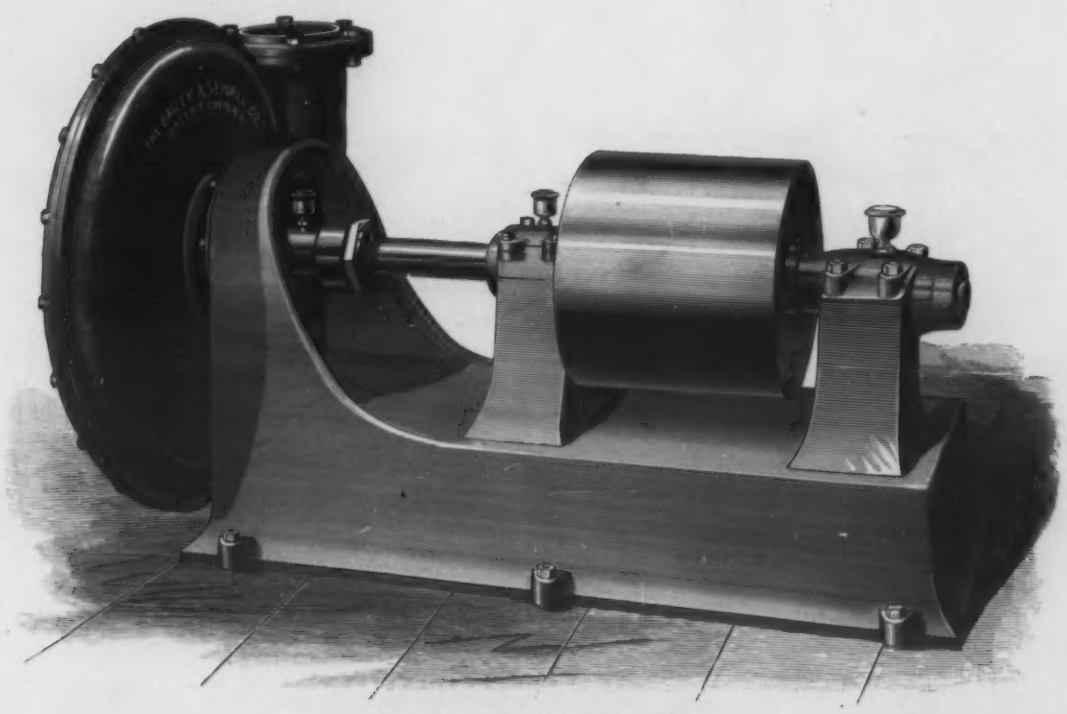

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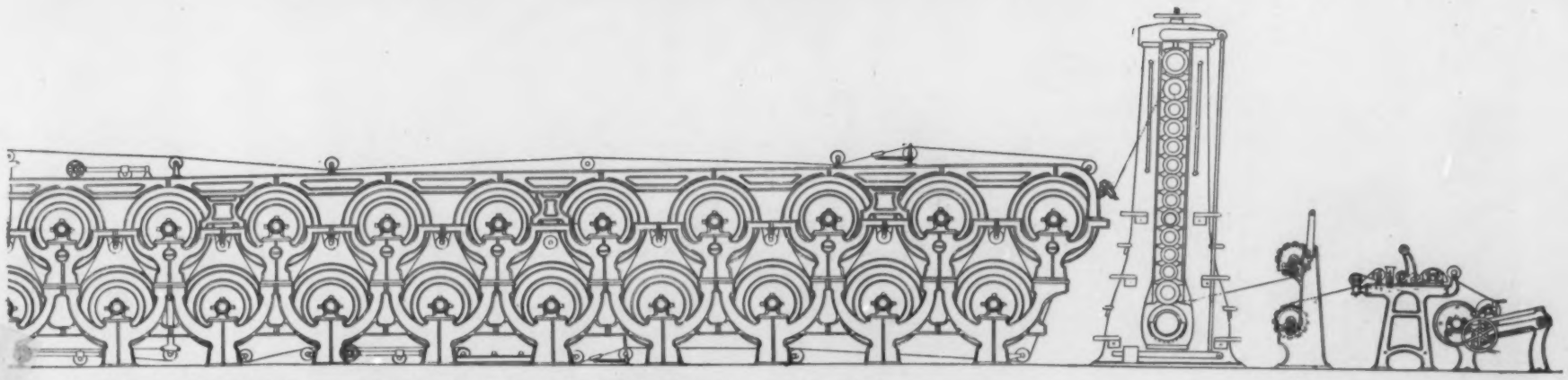

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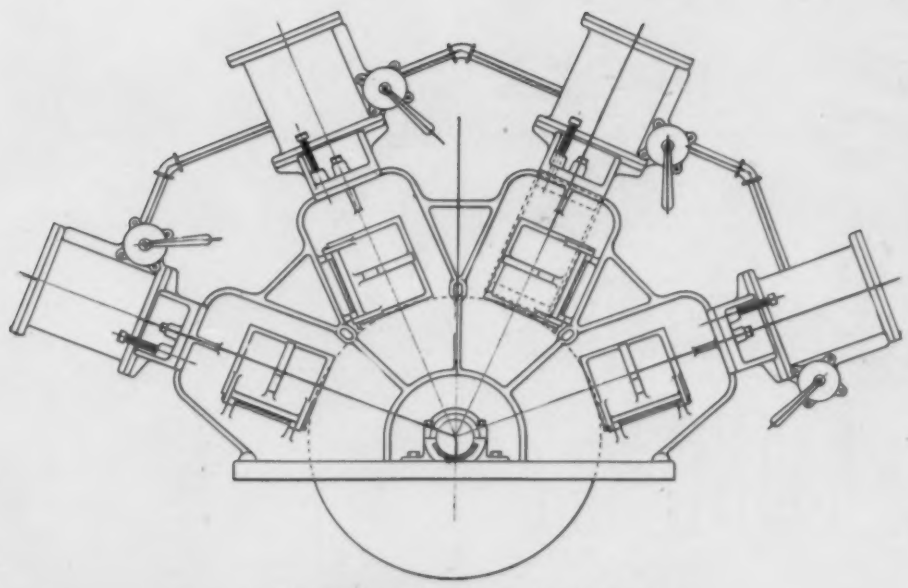

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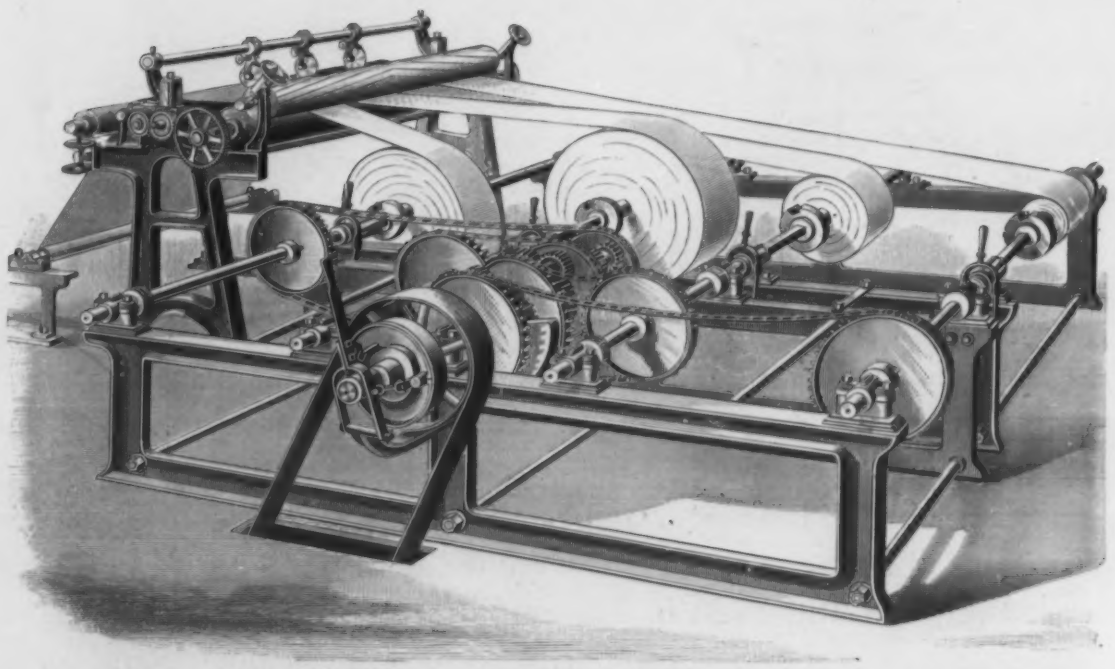

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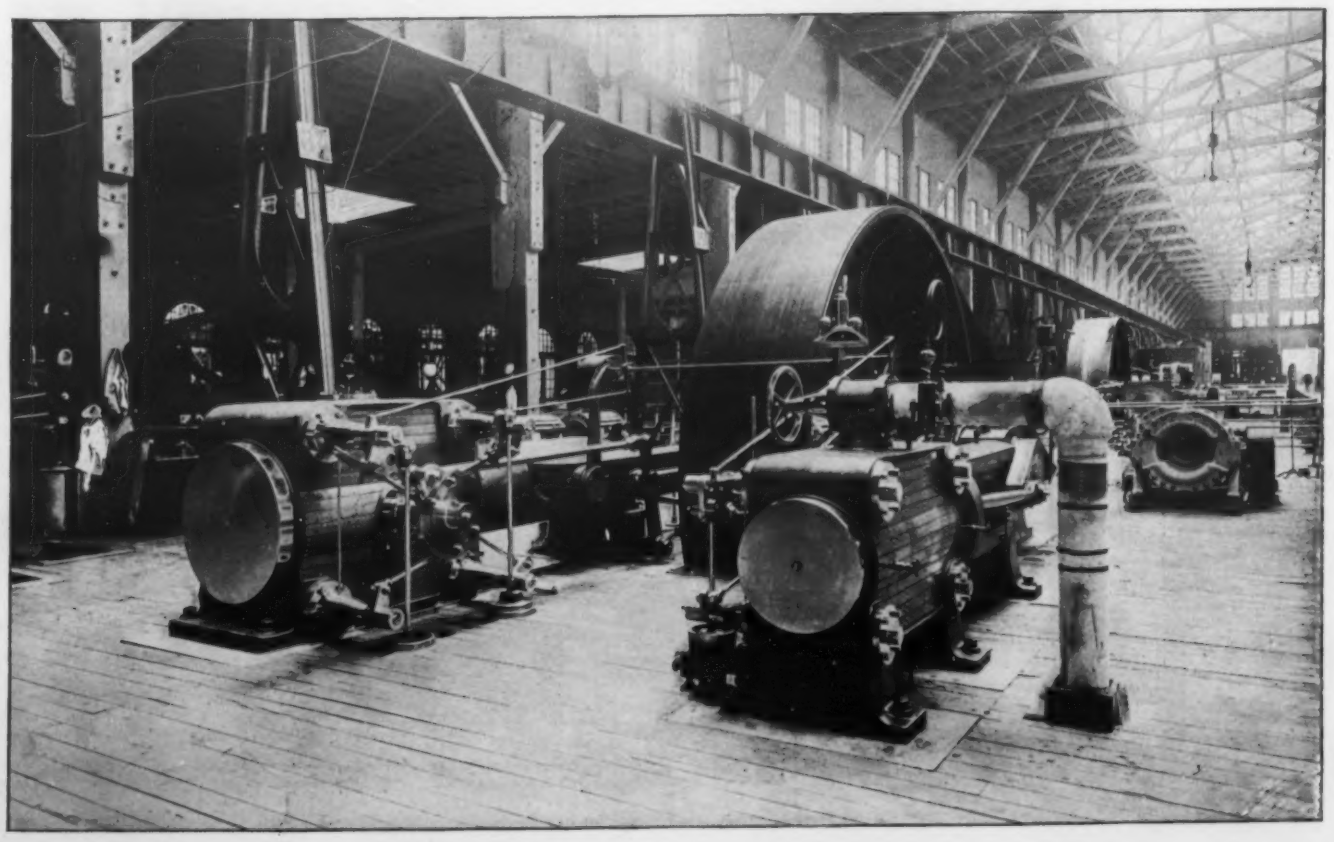

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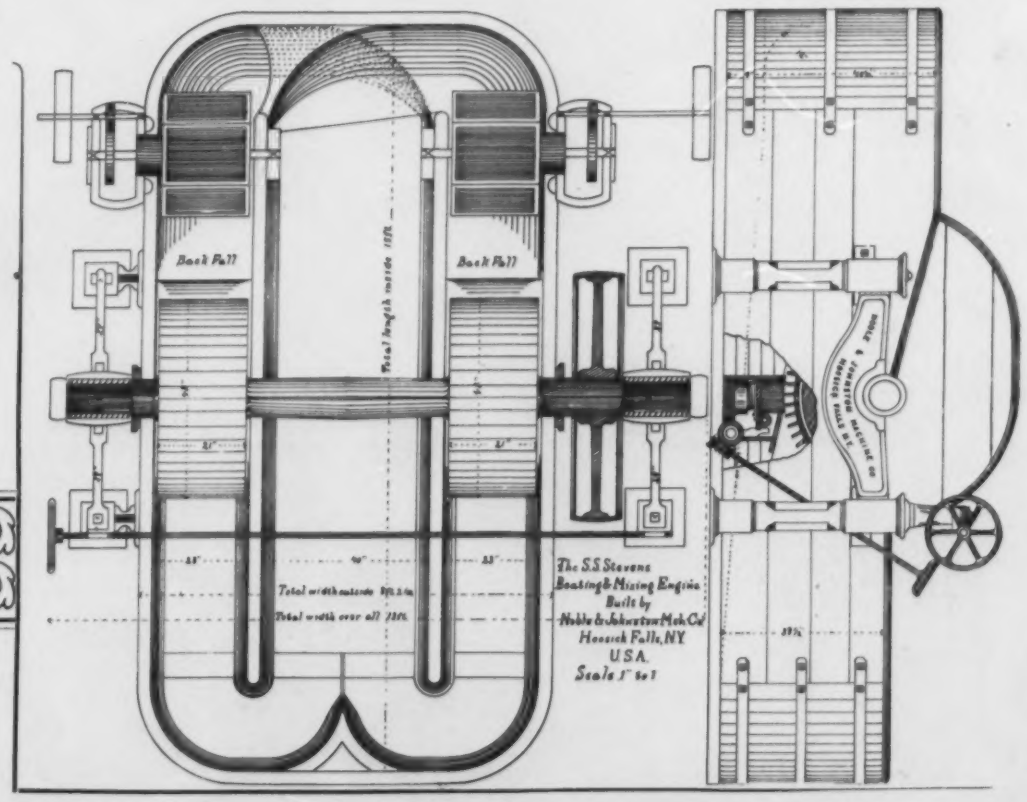
COMPLETE POWER EQUIPMENT.

The S. S. STEVENS DOUBLE-ROLL BEATING and MIXING ENGINE

PATENT APPLIED FOR.



Made in Sizes: 600 lbs., 1,000 lbs., 1,500 lbs., 2,000 lbs., 2,500 lbs., and 3,000 lbs.

This engine is built on the lines of the old Holland Engine, doubled and improved. Two beating rolls on one shaft with a centre return channel. This construction of the Engine is in such a manner that the stock does not lodge in the bottom. It requires no stirring, and is a thorough mixer. This Engine is both a washer, beater and refiner, and is built to beat stock for the finest grades of paper made to the coarsest. The stock is not cut up under the roll, but finely drawn out, and in that way makes a finer and stronger paper than other engines in general use. The bedplates are so arranged that they can be easily adjusted to the rolls while the engine is in motion, and need not be removed until worn out. A 2,000-lb. engine can be emptied into the stuff chest in five minutes when properly connected. This engine is fitted up with roller bearings, which reduce the power required ordinarily 30 to 40 per cent. Send for descriptive circular to

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AN HISTORIC PULP BILL.

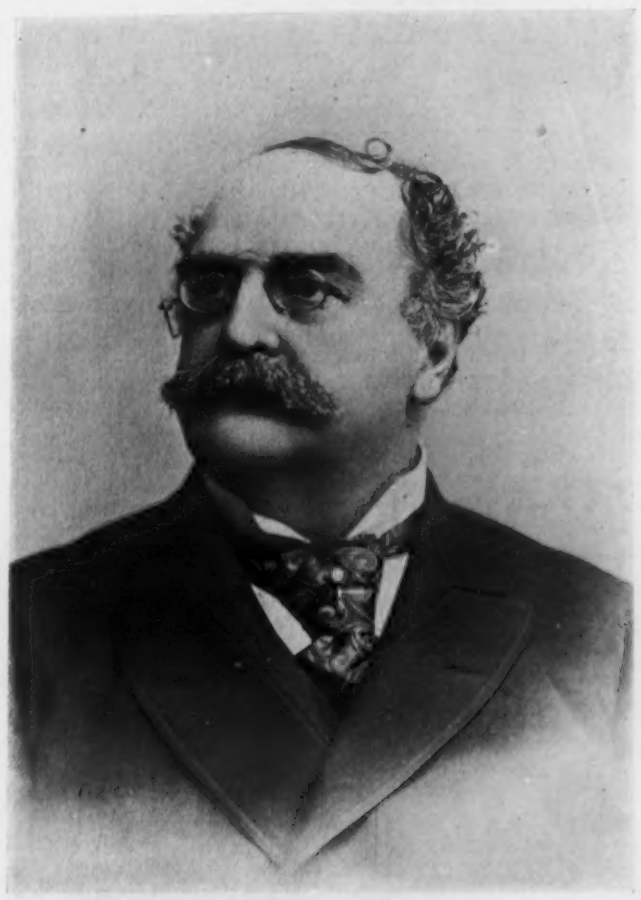
THE INVOICE OF THE FIRST GROUND WOOD MADE IN THE UNITED STATES.

The Pulp Was Sold at Eight Cents a Pound—The Price of News Paper at the Time—Reminiscences as to Paper Manufacture and the Equipment of Mills—Lee as a Paper-Making Centre.

By Hon. WELLINGTON SMITH.

IT will give me pleasure to comply with the request to contribute a few reminiscences to the issue of THE JOURNAL to celebrate the twenty-fifth anniversary of its establishment.

I remember Howard Lockwood very distinctly when he was in the paper-stock business, before he established THE JOURNAL. At that time there was no recognized paper-trade publication that I remember, and the establishment of the various publications that Mr. Lockwood started connected with the paper industry has fully kept pace with the marvelous growth of that



HON. WELLINGTON SMITH.

industry during the past quarter of a century, and is a credit to the paper manufacturers and their allied industries.

Twenty-five years! How soon it passes away in the retrospect, but how long it seems in anticipation. How many that were prominent and active in the paper business at that time have left us, and their familiar faces will be seen no more. Yet the ranks are full, and their successors are carrying forward our industry with greater enterprise and improvement in quality, and reduction in price, than have ever existed in the history of the world.

The introduction of wood fibre in the manufacture of paper has practically revolutionized the business. The introduction of ground wood in paper manufacturing in this country began in March, 1867, and with this communication I inclose you a copy of the invoice of the first *ground wood ever used* in the United States. The first shipment was made from Curtisville, in the town of Stockbridge, Mass., to the Smith Paper Company, on March 16, 1867, and, as you will see by the invoice, various other shipments were made during the month, and the bill rendered April 1 at 8 cents per pound.

Alberto Pagenstecher, a large, fine-looking German, on a visit to a friend in Stockbridge, Mass., noticed an idle water power at Curtisville, in that town. Knowing something about the recent introduction of ground wood under the Voelter patent in Germany, it occurred to him to introduce the process in this country, and he drove over to Lee to consult with the Smith Paper Company to see if we would take the product. At that time news paper was selling at from 14 cents to 15 cents per pound. We accepted his proposition to take the pulp, and thus began in a small way the ground-wood industry that has grown to such immense proportions in the United States. Subsequently Hon. Warner Miller secured the control of its manufacture for New York State, and Hon. William A. Russell for the New England States. The introduction of the "soda" and "sulphite" fibres subsequently, to be used in higher grade papers and to give additional strength, is familiar to all.

PRODUCT AND SPEED OF MACHINES.

Twenty-five years ago the product on a machine of two tons per day was considered large in any class of paper. The Smith Paper Company was the first to run a machine 100 feet a minute, and also to introduce one 100 inches in width. To-day, as is well known, 20 tons on one machine is no uncommon production, and a machine 162 inches wide, the widest, I think, in the world, and to run 500 feet per minute, is now being placed in position. These great changes and consequent reduction in the price of paper, owing to the peculiar facilities of water power and wood supply in the United States, enable our manufacturers, with the modern improvements in machinery, to produce paper at as low cost and equal in quality to anything made in the world. I think the limit has been nearly, if not quite, reached, and with the gradual absorption of the supply of wood the tendency will be during the next decade towards increasing the prices, and that the next quarter of a century will show no such changes in our line of business as have occurred during the period since the establishment of THE PAPER TRADE JOURNAL.

These great changes have resulted in driving out of the business many small mills that formerly did a lucrative business and gave employment to a large number of men and women. This has worked great loss and misfortune in many localities, but has built up others, and given to the public better service and quality of goods, at much lower prices.

As an illustration of this principle, at one time the town of Lee had twenty paper mills, including some hand-made mills that made paper for the bank bills that were used formerly by the State banks. Also, at that time, Lee was the largest fine-paper manufacturing centre in the United States. When THE JOURNAL was established, Holyoke, which is now the great manufacturing centre of high-grade writing and book papers, with its present daily capacity of 250 tons, was in its infancy; and none of the great Western plants, with their hundreds of tons daily production, were even thought of.

I think the paper industry has kept full pace with the march of progress and improvement with the other industries of the country and the world, although at the present time, like many other branches of business, it is in a depressed condition. I look soon for its speedy revival and its permanent improvement, for the use of paper enters into every variety of business to such an extent that it must ultimately return to its normal condition.

I wish THE JOURNAL and all connected therewith a prosperous and successful future, and trust it may continue the high standard it has always aimed to occupy in the paper industry.

THE "OLD REDSTONE" MILL.

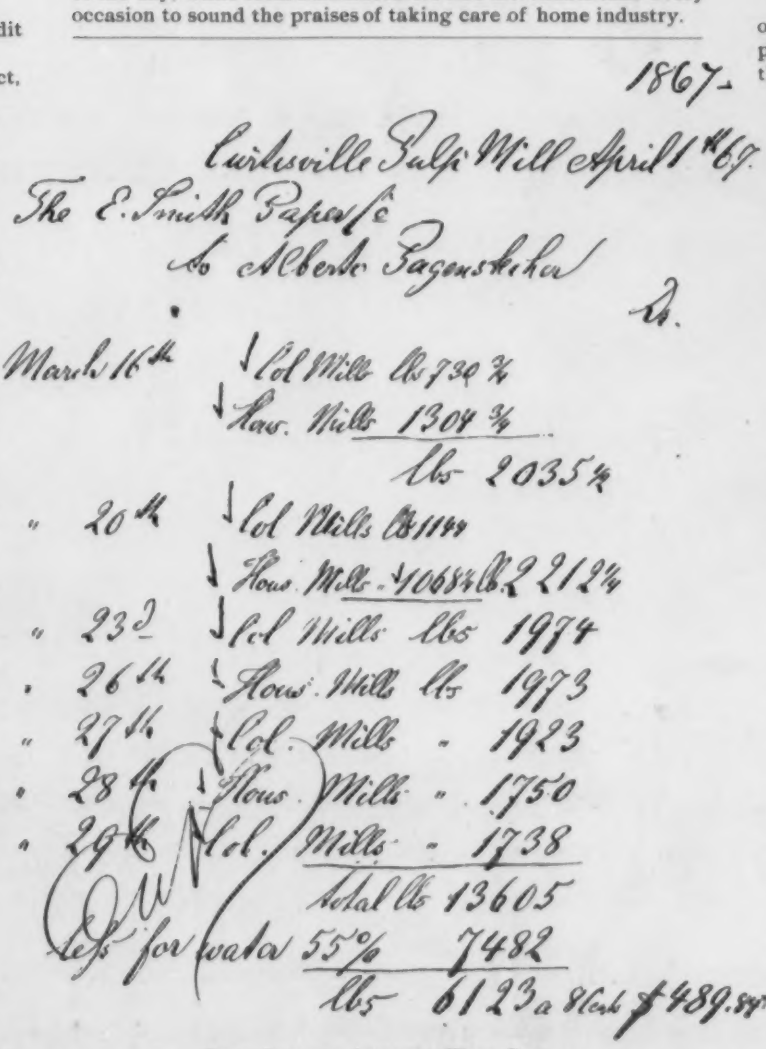
The First Paper-Making Plant in Western Pennsylvania.

Samuel Jackson and Jonathan Sharpless, both of whom were Quakers, put in operation in 1796 the first paper mill known to have been erected in western Pennsylvania. It was located four miles east of Brownsville, on the Monongahela River, and was known as the "Old Redstone" paper mill, facts which are stated by historical writers, such as Day in his "Historical Collections of Pennsylvania," and Smith in his "Western Annals."

Both Jackson and Sharpless had been raised in the neighborhood of the Gilpin Mills on the Brandywine, near Wilmington. Shortly after the mill was located, the following statement appeared in the Pittsburg *Gazette* under date of June 24, 1797:

"It is with pleasure we present to the public the Pittsburg *Gazette*, printed on paper made by Messrs. Jackson & Sharpless on Redstone Creek, Fayette County. Writing papers of all kinds and qualities, as well as printing paper, will be made at this mill. This is of great importance to the inhabitants of this country, not only because it will be cheaper than that which is brought across the mountains, but it will keep a large sum of money in the country which is yearly sent out for this article."

Even in those early days the advantage of encouraging home industry was recognized and was impressed upon the people by the public educators. In all the time which has elapsed since then the doctrine has lost none of its strength, and it is to-day being urged upon people of the various sections of the country, in every city, town and village by the editors of the newspapers of the day, while local manufacturers and merchants take every occasion to sound the praises of taking care of home industry.


1867.
Curtisville Pulp Mill April 1st 67.
The E. Smith Paper Co
to Alberto Pagenstecher
Dr.
March 16th 1 Col Mills lbs 739 3/4
1 Haus. Mills 1304 3/4
lbs 2035 1/4
" 20th 1 Col Mills lbs 1149
1 Haus. Mills 1068 lbs 2212 1/4
" 23d 1 Col Mills lbs 1974
" 26th 1 Haus. Mills lbs 1973
" 27th 1 Col. Mills - 1923
" 28th 1 Haus. Mills - 1750
" 29th 1 Col. Mills - 1738
Total lbs 13605
Less for water 55% 7482
lbs 6123 a 8 cts $489.84

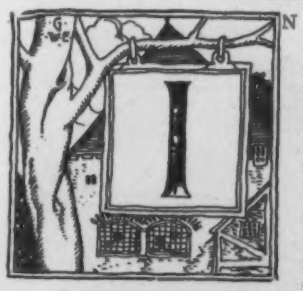
FIRST BILL FOR AMERICAN WOOD PULP.

MACHINE-MADE PAPER BAGS.

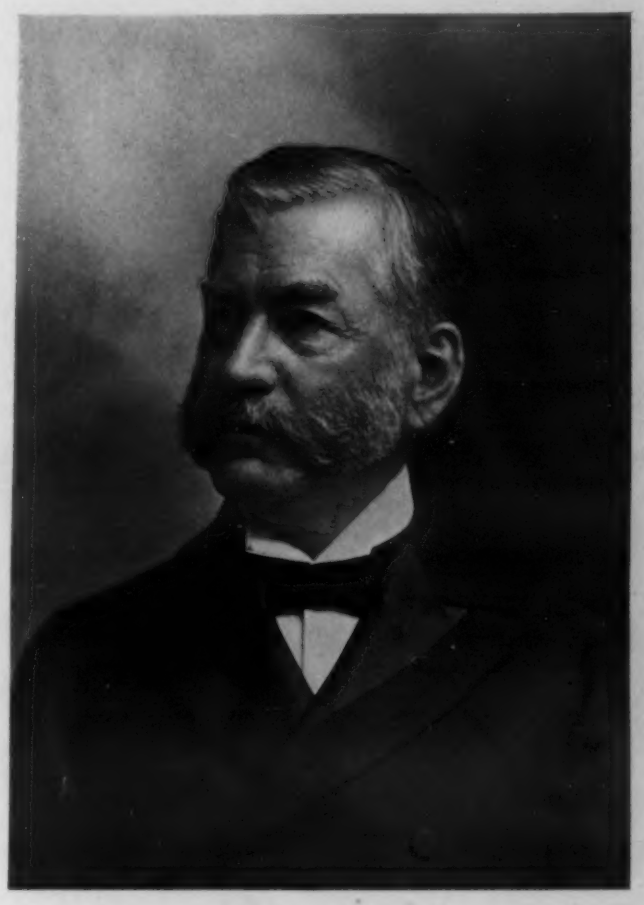
THE HISTORY OF THE EFFORTS WHICH HAVE LED TO PRESENT RESULTS.

The Old Process of Making Bags by Hand—The First Machine-Made Bag—Bethlehem, Pa., the Site of the First Factory—Patents and Royalties—Suggested Reforms in Patent Office.

By F. W. LEINBACH.



IN ye olden times the storekeepers often had dull days when customers were scarce and clerks idle; then the store counters were utilized to make bags of paper to facilitate the carrying of sugar, salt, rice and sundry other articles. The mode employed was simple and effective, and this is the way it was done: Sheets of suitable paper the size to suit the capacity of bags desired were folded so that a crease was made in the centre of the sheet. It was then opened out, and strips about three-quarters of an inch wide cut from two sides of one half the sheet. The sheet was folded



F. W. LEINBACH.

once more, paste applied to the overlapping edges and these pasted down upon the smaller half of the sheet. This produced the original flat bag, with a pasted seam down one side and across the bottom. This was the beginning of paper-bag making everywhere.

It was while thus engaged that Francis Wolle, a clerk in his father's store in Bethlehem, Pa., who had an inventive turn of mind, conceived the idea that some kind of a machine could be devised to assist and facilitate the operation of bag making. This was in the year 1837. His first efforts were without success, however, but in the year 1849 he renewed his attempt, and after diligent application he succeeded in 1851 in completing a machine for the purpose.

THE FIRST MACHINE-MADE BAG.

Application for a patent was made soon after, and on October 26, 1852, the first patent ever granted to anyone on a paper-bag machine was issued to him. The machine was fed by paper in rolls, the pieces for the bags being separated, cut in proper form, folded, pasted and lapped in the machine.

The bag had all the characteristics of the first hand-made bag, having one seam at the side and one at the bottom. With the financial aid of his brother, Augustus Wolle, who about this time took over the business of their father, machines were put in operation in Bethlehem in the fall of the year 1851. These machines were operated by hand power, and later on in 1852 a factory with several machines was operated by water power in the upper story of a woolen mill near the Lehigh Canal.

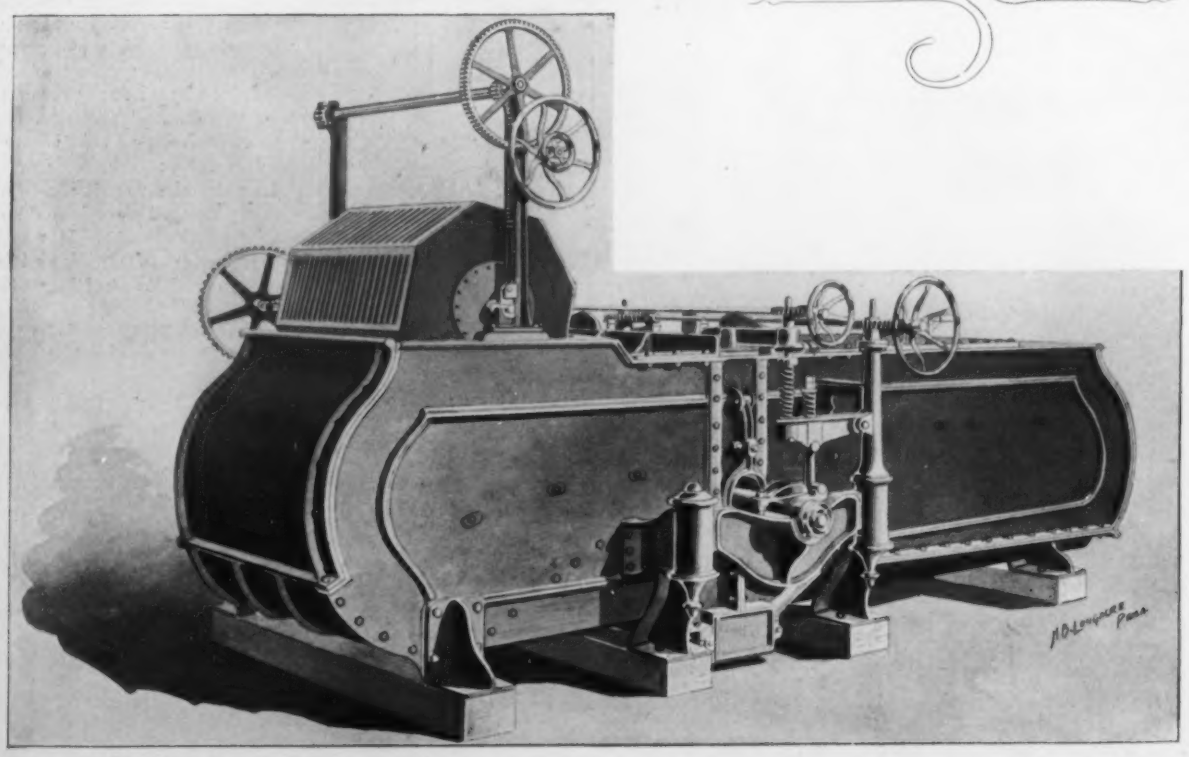
These first machines were in operation continuously until the year 1856. In 1855 Francis and Augustus Wolle took one of these first machines to the Paris Exposition of 1855, and it was considered one of the wonders of the Palais de l'Industrie on the Champs Elysées. But there seemed to be no market for paper bags or bag machinery in Europe at this early period, and the venture proved a failure. A second patent was issued to Francis Wolle, dated May 29, 1855, and a third in 1858. These machines made from twenty to thirty bags per minute. The enterprise proved unprofitable, and quoting from Wolle's testimony in one of the early suits, "it was found uphill work to overcome the habits and prejudices of the consumers of paper and bags."

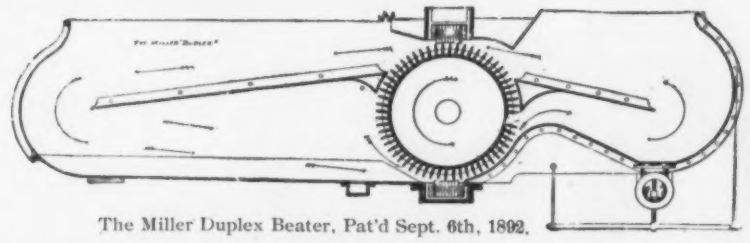
The business was new, no bags had ever been offered for

DOWNINGTOWN MANUFACTURING CO., Limited,

EAST DOWNINGTOWN, PA., U. S. A.,

Manufacturers of Paper Mill Machinery





The Miller Duplex Beater, Pat'd Sept. 6th, 1892.

The Miller "Duplex" Beating and Washing Engine

RECEIVED FIRST PRIZE MEDAL WORLD'S FAIR, CHICAGO.

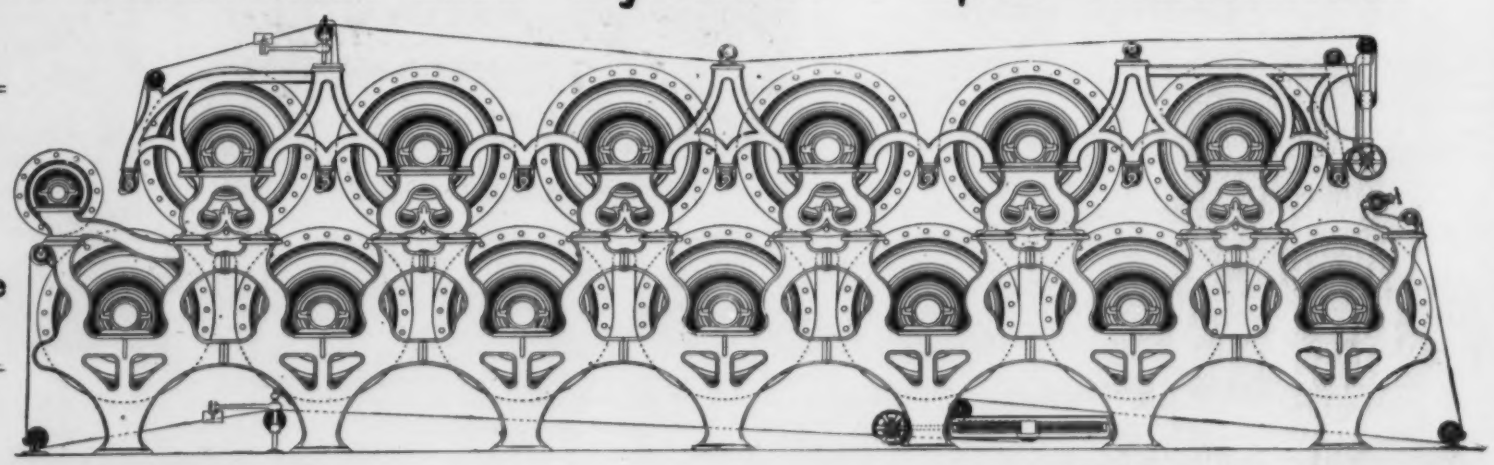
THIS ENGINE HAS TWO PLATES, ONE ABOVE AND ONE BELOW THE ROLL. BEATS THE STOCK TWICE EVERY TIME IT CIRCULATES THROUGH THE TUB. ONE DUPLEX WILL DO THE WORK OF ANY TWO BEATERS OF THE SAME SIZE ON THE MARKET. HAS A PERFECT CIRCULATION. SAVES POWER. SAVES LABOR. SAVES FLOOR SPACE. IT IS A RAPID WASHER AND A PERFECT MIXER. MAKES ABSOLUTELY EVEN BEATEN STOCK. BUILT OF WOOD OR IRON

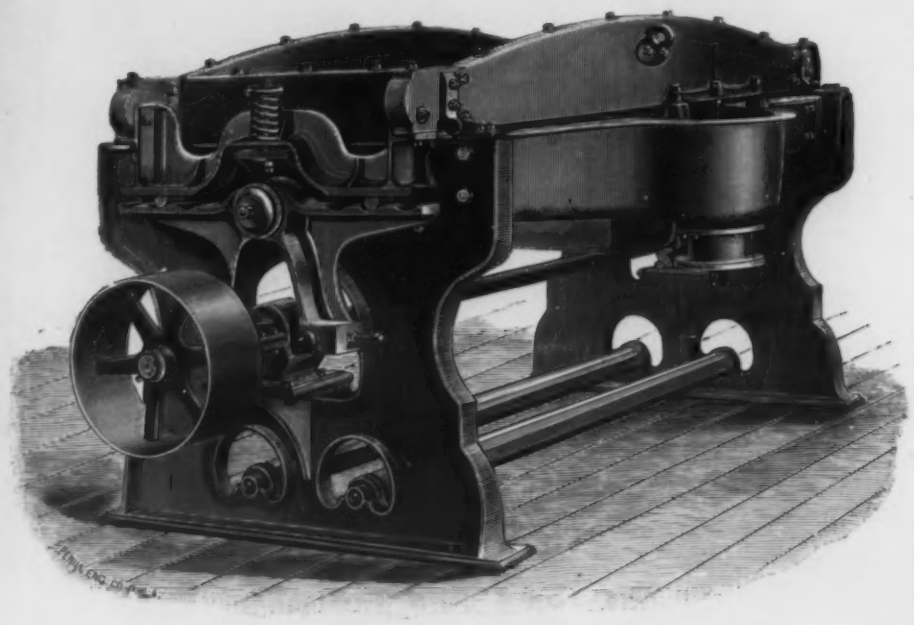
High Grade Fourdrinier and Cylinder Paper Machines.

Heavy Calenders.

Slitting and Rolling Machines.

Single and Double Cone Cutters.

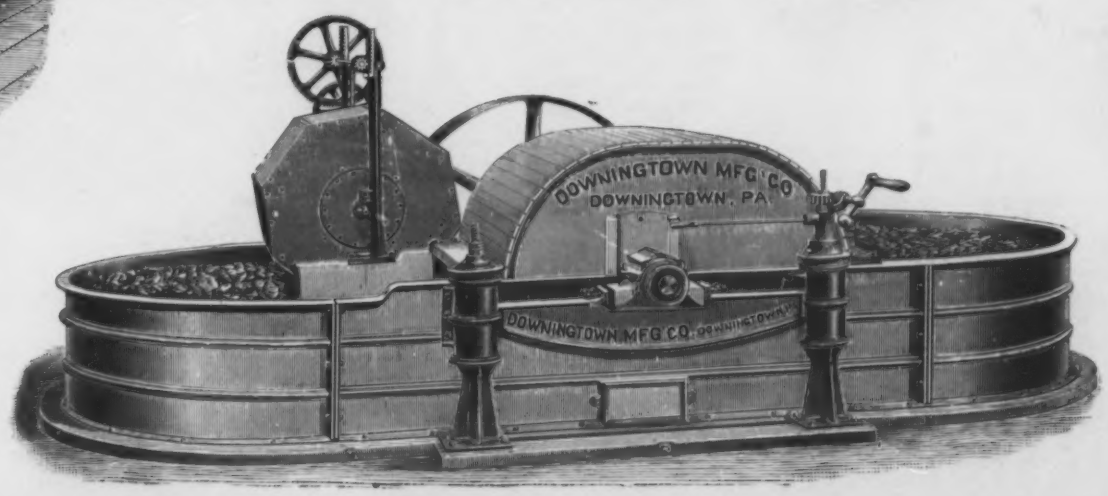




SPECIAL MACHINES FOR THE MANUFACTURE OF HIGHLY FINISHED LINED BOARDS.

THE KEYSTONE NOISELESS SCREEN.

SOLID CAST IRON VAT AND FRAME. THE CRADLE VIBRATED UPON AN ENTIRELY NEW PRINCIPLE, THE MOTION BEING TAKEN SIMULTANEOUSLY FROM THE OPPOSITE SIDES OF THE CAM. LIGHT RUNNING. POSITIVE AND REGULAR SUCTION. THE MOST DURABLE SCREEN ON THE MARKET.



The Best Turning Holland Engines Built.

DOUBLE LIGHTERS. QUICK RELIEF LEVERS.
ADJUSTABLE BOXES. BUILT WITH WOOD OR IRON TUBS.

Cylinder Washers.

Paper Mill Pumps of Every Description.

sale, and every storekeeper had been accustomed to make his own bags.

The First Machines Put Out on Royalty.

The first machines ever put out on royalty were sold to a Mr. Walch, of Newburgh, N. Y. In 1856 machines were sold to the North American Paper Bag Company, of Philadelphia. Walch abandoned the business in about six months, and also sold his machine to the North American Company, of Philadelphia. This Philadelphia company had about six of the Wolle machines.

The next man to build bag machinery was John A. Smith, of Clinton, Mass., who was thus engaged in 1853. In 1854 S. E. Pettee, of Foxboro, Mass., became interested with Smith in improving his machine, and a joint patent was obtained by them on May 1, 1855.

In the fall of 1855 Franklin Rice assisted Smith in the building of a second machine. These Smith-Pettee machines were afterward sold to the Philadelphia company, the same company which bought the Wolle machines. Both the Wolle and Smith machines made bags from the flat sheet, and necessarily operated intermittently. It was not profitable to run them. The North American Paper Bag Company only operated them about two years.

Bags from a Continuous Tube.

Benjamin F. Rice, of Clinton, Mass., now appears upon the scene of bag-machine invention, and to him belongs the credit of first devising a machine to make bags from a continuously moving tube of paper without waste. He obtained his first patent April 28, 1857.

Horatio G. Armstrong, of Philadelphia, is the next inventor of this style of machine, and he it was who succeeded in making the first rapidly working machine, which he accomplished by striking off the tube into bag lengths while passing rapidly over the end of serrated blades with a "revolving breaker," as it was called.

S. E. Pettee having disposed of his first machines to the Philadelphia company, and hearing of Armstrong's machines, became interested with him, and, in fact, made important improvements on the machine. A patent was obtained by Armstrong dated October 2, 1860, of which patent S. E. Pettee acquired a one-half interest.

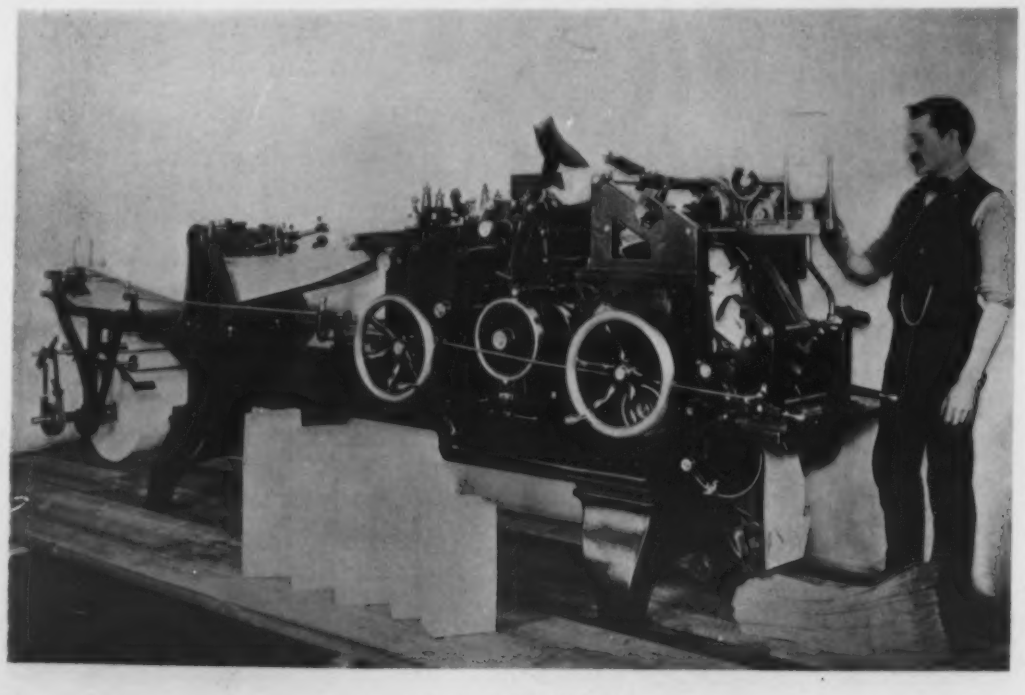
In April of 1861 August Wolle bought of Armstrong his interest in this patent, together with his three machines. On April 17 Francis and August Wolle sold an undivided one-third interest in all their patents and machinery to F. W. Leinbach, then of Salem, N. C.

On May 8, 1861, at Bethlehem, Francis and Augustus Wolle, S. E. Pettee and F. W. Leinbach signed a copartnership agreement under the name and style of the Union Patent Paper Bag Machine Company, each partner owning one undivided quarter interest, the whole united interest being valued at $25,000. It was soon found that the Benjamin F. Rice patent of April 28, 1857, would be invaluable to the success of this new enterprise; therefore on October 11, 1861, a new agreement was signed between the original members of the firm and L. Whitney, Jr., & Co., of Boston, the owners of the Rice patent, who became interested in the partnership.

It was not long after this that Hollingsworth & Whitney succeeded L. Whitney, Jr., & Co., and became the licensees for the New England States. In the following years licensees were appointed as follows: In Philadelphia, McCauley & Howlett, succeeded by Howlett & Onderdonk; in Baltimore, Smith, Dixon & Co.; in Cincinnati, A. Bepler & Co., succeeded by Chatfield & Woods; in Chicago, Wheeler & Hinman, succeeded by Wheeler & Fisher; and in St. Louis, Bixby, Forbes & Co., succeeded by Cupples & Marston. These licensees paid a royalty of four cents per thousand for all bags made.

During the years from 1861 to 1866 about thirty machines were put out under royalty, and about as many more were sold in Europe, and in the following years many more were sold to the licensees in the United States.

In June, 1869, the Union Paper Bag Machine Company was incorporated as a stock company under the laws of Pennsylvania with a capital of $250,000, and again called the Union Paper Bag Machine Company. In 1871 the company sold out all its patents,



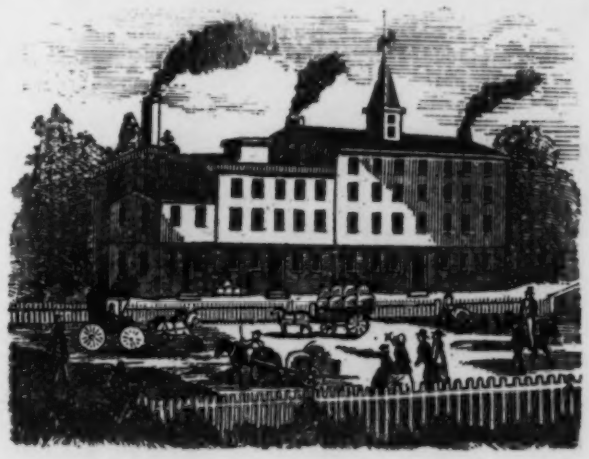
Jumbo S. O. S. Bag Machine.

machinery and other property to its licensees, who have since that time been successful manufacturers of paper bags. They also acquired by purchase, after expensive litigation, a patent granted to L. C. Crowell, dated February 20, 1872, for a bellows-sided bag, which became quite a popular bag, though undeservedly so, as it required the hand to be thrust into it to make it open and assume even a tolerably square or flat bottom. The same inside manipulation with the hands before using was necessary with the original flat bag. It was very important to obviate this ugly feature in the use of paper bags, by which deadly germs and microbes might attach themselves to the inside of bags from perspiring and unclean hands, thus spreading disease and death with the very sugar, salt, tea, coffee and other articles of domestic and everyday use sold by the grocers. It was thought for a long time that the satchel bottom bag came the nearest to a sanitary receptacle for the carrying of groceries, but this bag, in a more or less degree, also required the same thrusting inside of the hands to prepare it for filling.

Mrs. Margaret Knight, of Boston, an intelligent forewoman in a place where these bags were made by hand, devised some of the first mechanical assistants for folding paper tubes into the form of a diamond, which was the preliminary fold of a satchel bottom. A patent was obtained by her early in the seventies, which she afterwards disposed of at a good price. I believe she is the only woman inventor who assisted in the development of paper-bag machinery. That she did not press her advantage is to be regretted, as she certainly displayed commendable inventive ability.

The satchel-bottom bag was the popular form for flour sacks as early as 1865, and at that time was almost entirely made by hand. They were made in this way in limited quantities by all the licensees of the Union Paper Bag Company, but gradually this trade drifted into the hands of firms who made a specialty of making flour sacks, notable among whom were Arkell & Smith, of Canajoharie, and Taggert & Farr, of Bellows Falls.

The first satchel-bottom bag patent was issued to Arkell & Smith on April 25, 1865. This style of bag was also made by hand as grocer's bags, but on account of its shape when folded and in bundles being wide and uncouth looking, and taking up as much room as the old flat bags, it never became popular as a grocer's bag. No rapidly working machines to make it as a grocer's bag were invented earlier than about 1879. Cross, Stillwell and others afterwards obtained patents on machines for making such bags, but even as late as 1884 none of these machines were in successful oper-



First Machine Paper Bag Factory.

ation, and up to the present time the manufacture of that style of bag has never been financially successful.

In the early part of 1876 F. W. Leinbach began making experiments on a satchel-bottom machine, and in 1877 the firm of Leinbach & Wolle was formed, and these experiments were carried forward with renewed energy. During 1879 and 1880 several patents were issued to Leinbach & Wolle, embodying the most-advanced devices for constructing rapidly running satchel-bottom bag machines. The question of finding out how to make a real sanitary bag which should combine all the good qualities of previous bags, and at the same time be free from the danger of microbes and germs of disease in consequence of having unclean hands thrust into it, occupied the close attention of these parties, and the result was the discovery by F. W. Leinbach early in 1878 of a bag folded in a peculiar way that could be opened out into a perfect box-like shape, ready to be filled, without any inside hand manipulation whatever. It is this bag which has since then become so popularly known as the "Self-Opening Square" or "*S. O. S. Bag*," a perfectly safe sanitary paper bag, which exactly fills all the wants of the trade and entirely prevents the danger of spreading disease and death through the distribution of the foods we buy of grocers.

Immediately after the discovery of this new sanitary bag, which really combined the good bottom of the satchel-bottom bag and the side folds of the ordinary Crowell square bag, the inventive genius of these parties was severely taxed to devise a machine capable of making the bag commercially. They were told by parties well acquainted with the manufacture of bags, to whom the new bag was shown, that it would be practically impossible to make such very complicated foldings in paper on a machine, but in spite of all such discouragements success attended their efforts, and the result was that about the beginning of the year 1881, in Bethlehem, the birthplace of paper-bag machinery, on a crude experimental machine the first of the new "*S. O. S.* paper bags" were made. Shortly after this demonstration this first machine was taken to the Pratt & Whitney machine shops, of Hartford, Conn., to be further improved and reconstructed under the inventive genius of Wm. A. Lorenz, who was assisted by Wm. H. Honiss, both being engaged under contract

American Bag Machine at Paris Exposition.

with Leinbach & Wolle for more than three years, during which time a force of from seven to ten draughtsmen were engaged in perfecting this new invention. Numerous patents were taken out to secure all the improvements made by these inventors, and more than $55,000 was spent in experimental work, drawings, patterns, tools, etc., before the result was entirely satisfactory. So very thoroughly was this work done that the complete machines which were set to work making these new bags in 1886 by L. Waterbury & Co., in Brooklyn, and by the Pultz & Walkley Company, in Plantsville, Conn., are yet in successful operation. These two firms were the first licensees to use the machinery, paying to Leinbach & Wolle a royalty of 4 cents per 1,000 for all bags made.

During the Paris Exposition of 1889 two of these machines were exhibited, and were in daily operation making bags for the thousands of sight-seers who crowded around the railing of the 30 feet square enclosure.

The Anglo-American Paper Bag Company, of London, was soon afterward organized and sixteen of the machines were operated in that city, all of them having been supplied from this country.

There was another bag machine exhibited in the Paris Exhibition of 1889 as an English machine, but in reality it was an American invention, known as the Cross machine from Boston, for making the satchel-bottom bag.

The firm of L. Waterbury & Co. and Pultz & Walkley Company continued to manufacture the "S. O. S." bags under royalty until 1891, when a consolidation of all the manufacturing and royalty interests was brought about and those interests were all transferred to the "Consolidated S. O. S. Bag Company of New York." This company now controls the whole territory of the United States, and owns over 100 patents covering all the important inventions pertaining to the manufacture of the S. O. S. bags. Its business is increasing yearly, and it consumes the product of no less than four paper mills, or over 25 tons of paper per day, on its 100 machines located in its two factories, one in Brooklyn and one in Plantsville, Conn.

In the first years of machine-made paper bags it was difficult to find a market for them, but as soon as the storekeepers found out that the bags were almost as cheap as the sheet paper which they had been accustomed to buy to make into bags the demand began to increase, and from the earliest organization of the original Union Paper Bag Company the yearly increase was phenomenal until now, when the consumption is not much short of five thousand millions of bags per annum in this country alone. While in 1856 bags were sold with difficulty in hundreds, now as many as six railroad box cars are frequently loaded and shipped in a day, with an average load of about two million bags in each. Besides the Consolidated S. O. S. Bag Company, which company makes no other style of bag than the new sanitary S. O. S. bag, there are other large manufacturers of the old-style bags. Conspicuous among them are the former licensees of the original Union Paper Bag Company, who produce millions upon millions of various styles of bags. This new sanitary S. O. S. paper bag seems to be the very acme of invention in the line of paper bags, and it is hardly possible that invention or discovery can ever find a bag to supersede it in form or general utility. Its sanitary qualities alone entitle it to gradually take the place of all other bags, though these may be sold ever so cheap. Its great advantages are that it opens out into a box-like form by simply giving it a gentle pull by its extreme ends, or else by giving it a flip with one hand so that the air will enter the mouth and distend it.

In the foregoing pages I have endeavored to give a true and accurate account of the early days of paper-bag machine invention, and of the legitimate line of progress in the evolution of the paper bag, and I have not intentionally left out anyone who materially assisted in such legitimate conduct of invention. There were numerous contemporaneous inventors, men who copied what others had originated and created, others who improved or infringed. Much might be said about the almost endless litigation as to priority claims and claims for infringement of patents, but it is unnecessary to go into all this. Hundreds of thousands of dollars have been foolishly wasted in such litigation. Since the first patent was issued in 1852 to Francis Wolle, to the present time, 229 patents have been granted on paper bags and 382 patents on paper-bag machinery, making a total of 611 patents.

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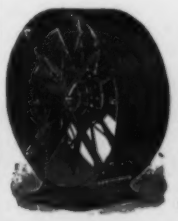

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Paper Dryers,
Heating Apparatus,
Blowers and Engines.

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SUCCESSORS TO
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No Sawdust. No Slivers.

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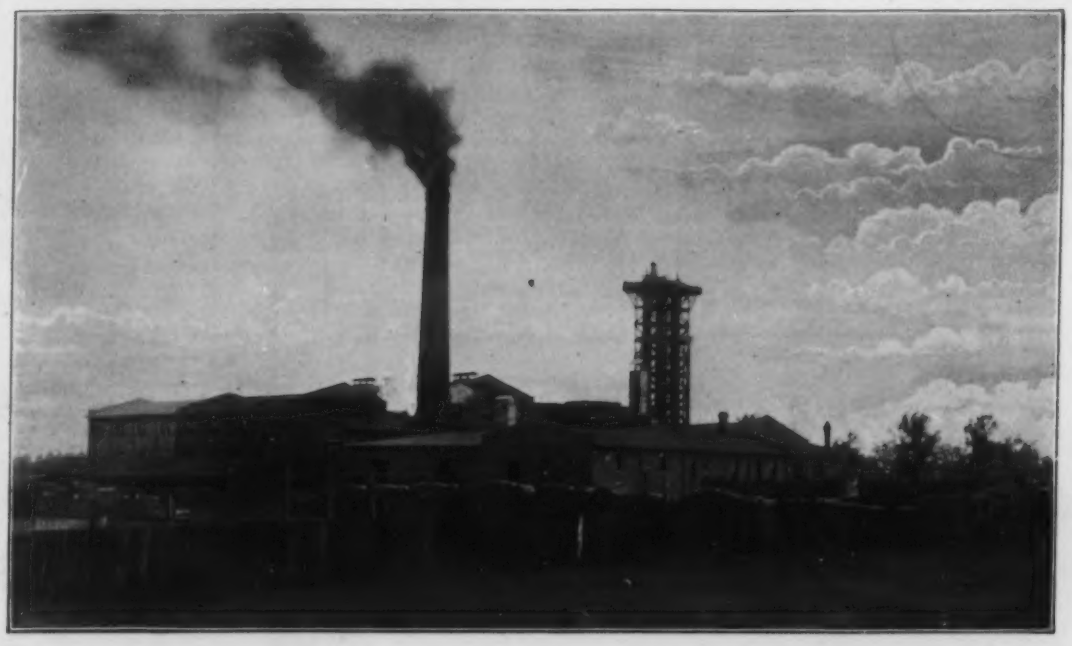

MICHIGAN SULPHITE FIBRE COMPANY,

75 Home Bank Building, Detroit, Mich.

THE above mill is situated at Port Huron, Mich., and the present capacity is twenty-five tons daily, but this will, however, be materially increased by the addition of another large digester which is now in the course of erection. This fibre is made by what is known as the "Mitscherlich" process, much more time being taken to cook, using a weaker liquor and lower pressure, thereby ensuring a much stronger fibre than the pulp made by mills using the "quick" cook process. Unusual care is taken in sorting the wood, causing naturally a greater expenditure, but by doing so a fibre is produced which is fully equal to if not better than the best imported brands.

It is to a large extent used by mills making a better grade of paper, and is much sought after on account of its high color, purity, and last but not least on account of its softer fibre, which is not as harsh and hard as pulps made by the Mitscherlich process usually are, though this fibre has fully the strength which is obtained by this method.

Messrs. Frederick Bertuch & Co. and **H. O. Bateman,** Temple Court, New York, have been appointed sole selling agents for the Eastern States, and will gladly answer all inquiries and submit samples and prices.

The Government has charged as fees on these patents $21,385. Solicitors have charged about $45 each for soliciting them, which amounts to $27,495, making the cost of obtaining these 611 patents $48,880. How many of these were worth the cost is a question that suggests itself. Again, how many of all the patents that issue from the Patent Office are worth anything at all. Now, in view of all these facts, why would it not be a very philanthropic proceeding for our Congress to enact new Patent Office laws relating to the granting of patents, whereby the cost of obtaining them could be reduced to a nominal sum, merely enough to pay the legitimate expenses of conducting the office. Everybody knows that the examinations in the Patent Office are, at most, very superficial as to the state of the art, etc., and that to establish the real value of a patent it must run the gauntlet of expensive litigation in the United States courts. Why not, therefore, reduce as much as possible the Government fees now charged in the procuring of patents? For years the annual reports of the Commissioner of Patents have shown constantly increasing profits, which profits have annually been turned over to the United States Treasury, where there is a large amount to the credit of the Patent Office. Every intelligent, thinking mind will discover a great mistake in all this. There is no good reason why the Patent Office should be a money-making department of our Government, particularly so when we remember that the money is taken mostly from the pockets of our own citizens, who, in the large majority of cases, receive from the Government no value whatever in return.

A price card issued in 1867 gives figures as follows:

14 lb. cap,	$6.30	$5.95
12 " cap and letter,	5.40	5.10
10 " " " "	4.50	4.25
9 " letter,	4.05	3.83½
8 " "	3.60	3.40
7 " "	3.15	2.97½
6 " note and Bath,	3.00	2.85
5 " " " "	2.50	2.37½
4 " " " "	2.00	1.90
5 " octavo,	2.75	2.62½
3¼ " "	2.11	2.03
2¼ " billet,	1.52	1.46

The prices per pound were given as follows:

Cap and letter,	$0.45	$0.42½
Note and Bath,	.50	.47½
Octavo, 5 lb.,	.55	.52½
" 3¼ "	.65	.62½
Billet, 2¼ "	.67½	.65
Flat letter,	—	.40
Flat cap and folio,	—	.38

An old price card of Dobler, Mudge & Chapman, paper dealers, Baltimore, Md., announces reduced prices on Platner & Porter's papers, the card, however, not being dated. The reduced prices are as follows:

Tunxis notes,	31 cents.
" letters and caps,	30 "
" notes "M,"	27 "
" letters and caps "M,"	26 "
Nolia notes,	27 "
" letters and caps,	26 "
" notes, letters and caps "M,"	24 "

THE AMES FAMILY.

The Leading Manufacturers of Their Day.

No historical sketch of paper making in this country would be complete which did not include a reference to the Ames family and its tremendous influence on the industry.

David Ames, the senior, was sent to Springfield, Mass., by George Washington, during his second presidential term, to establish the national armory at that place, he being commissioned a colonel. For some reason Colonel Ames resigned his commission and became a paper manufacturer. In 1800 a mill had been built at Springfield by one Patten, of Hartford, and it was this mill which Colonel Ames purchased.

It was not an extensive establishment, being known as a two-vat mill, and being equipped with two rag engines, each of 120 pounds' capacity. The cogs, pinions, gearing, etc., were all of wood, and the power was furnished by an undershot wheel. In 1820 iron gearing was put in the mill, and by that time its capacity had been nearly doubled.

In a few years after venturing in the new line of industry David Ames admitted to a partnership his two sons, David, Jr., and John.

In 1822 David, Jr., returned from New York with the news that the Gilpins, of Brandywine, Del., had invented a machine by means of which paper could be made. His bit of news set his brother John, who was the inventor of the family, at work, and he produced the cylinder machine. The model of the new machine was made by Deacon Worthington, of Springfield, and the patent papers were drawn by John Ames himself, the patent being granted to him May 14, 1822.

This new machine not only laid the foundations of the fortune of the Ameses, but it also began for them a series of troubles which lasted for years. Before they were able to accomplish much with it to their own advantage in a commercial way, they had on their hands a fight to protect the patent.

Howard & Lathrop built a mill at South Hadley Falls, and hiring the Ames foreman, Eli Stephenson, they put in a cylinder machine which was an infringement of the Ames patent. The owners of the patent began suit, and a combination of manufacturers was formed to defend. Both sides sent attorneys abroad to sift, if possible, the contention that such a machine was in use not only in England but also in France and Italy. The case finally came to trial, and after a hearing lasting over twelve days the Ameses won and injunctions were issued.

The Ameses allowed almost no outsiders in their mill. Their employees were sworn to secrecy, but at the trial of the patent suit it was disclosed that two men one night broke into the Ames mill and made drawings of the machine. The drawings, however, were not very serviceable, as the machine constructed from them did not work satisfactorily.

The winning of the case did not end the litigation, however. The Ameses fought for the patent for seven years, and in the end were beaten so far as practical results were concerned, while the legal expenses were an exceedingly heavy burden to them.

In 1828 David, Jr., and John bought their father's interest, and formed the firm of D. & J. Ames, one of the most celebrated houses in the annals of American paper making.

The firm endeavored to have their patent extended, but the congressman to whom they entrusted their case neglected their interests as he afterwards neglected and proved false to other interests, and never gave it any attention.

John Ames continued to invent labor-saving appliances for use in the mill, but his faith in the efficacy of patents had been broken. He patented very few of his inventions, but depended upon deriving the benefits arising from their use by keeping their existence secret. All the employees were pledged, but notwithstanding that news of the various inventions crept out and other manufacturers profited by them. In 1831 he invented a washing engine; in 1834 a knife for truing paper; in 1832 a pulp dresser; in 1835 a process for drying paper on cylinders on the machine; in 1837 a machine for sizing and later a number of other devices and processes.

The firm of D. & J. Ames prospered. A former employee of theirs, Ward by name, had built a mill at Suffield. This they purchased. They also bought a mill at Chicopee Falls which had been erected by a man by the name of Cox, and in that mill George L. Wright, of the Worthy Paper Company, of Mittineaque, learned his trade. They also purchased a mill at Northampton, on the site now occupied by the Woronoco Paper Company, and employed J. C. Parsons, who afterwards founded the Parsons Paper Company, of Holyoke, as agent. Later they built a twelve-engine mill at South Hadley Falls, and transferred Mr. Parsons to that establishment. They operated five mills, and John Campbell & Co., of New York, were their agents.

They made money rapidly, and for years they were by far the largest manufacturers in the country. Their product was book, news and writing, and it is said that all these grades were produced from the same stock and by the same process. Their book and news sold at 9 cents a pound, and at times it was cut up, ruled and sold as writing at 18 cents a pound. When rags became high they bought cardboard shavings in New York at 2½ cents a pound, worked it with rags, and sold the paper made from this stock at 25 cents a pound.

In 1837, during the panic, they, in common with many others, met with disaster. They continued along in a crippled condition for some years but later their mills were sold. Their original mill at Springfield was purchased by Greenleaf & Taylor, and a few years later was destroyed by fire.

David Ames, Sr., died August 6, 1847, aged eighty-seven years. David Ames died March 12, 1883, aged ninety-two years. John Ames died January 25, 1890, aged ninety years.

J. C. Parsons used to tell of his experiences while at the Northampton mill. Paper was then shipped on flat boats which were poled to Hartford, the paper being placed on sloops and taken to New York and other points. Small articles were shipped between Northampton and Boston by teaming all the way, the round trip occupying a week. The freight rate was a cent a pound. The rate by boat was from $8 to $10 a ton.

"The water that has run the 'mill' does grind again."

3,000 Horse-power of Water.

300 Horse-power of Electricity.

60,000 pounds of Paper per day.

50,000 pounds of Pulp per day.

MILLS OF CLIFF PAPER CO., NIAGARA FALLS, N. Y.

Cliff Paper Co., Niagara Falls, N. Y.

WE INVITE CORRESPONDENCE WITH CONCERNS WISHING A SURE SUPPLY OF . . . MATERIAL. . . .

THE SANDY HILL IRON AND BRASS WORKS,

Manufacturers of ....

PULP AND PAPER MACHINERY,

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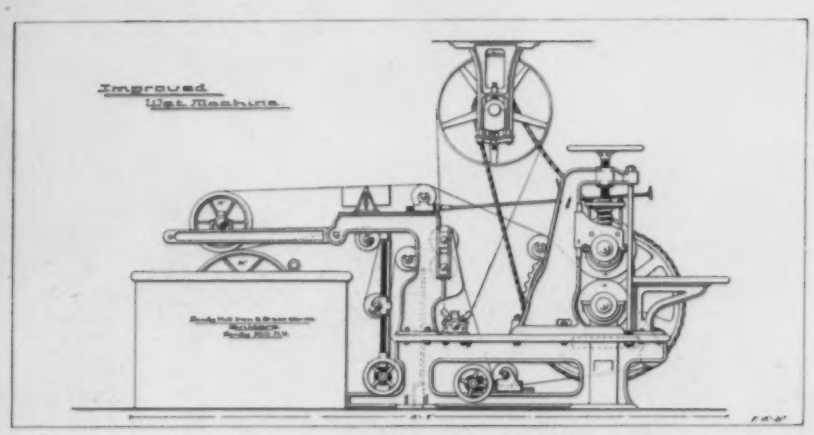
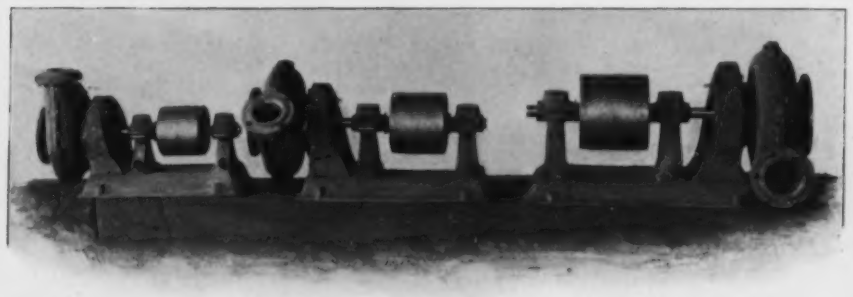
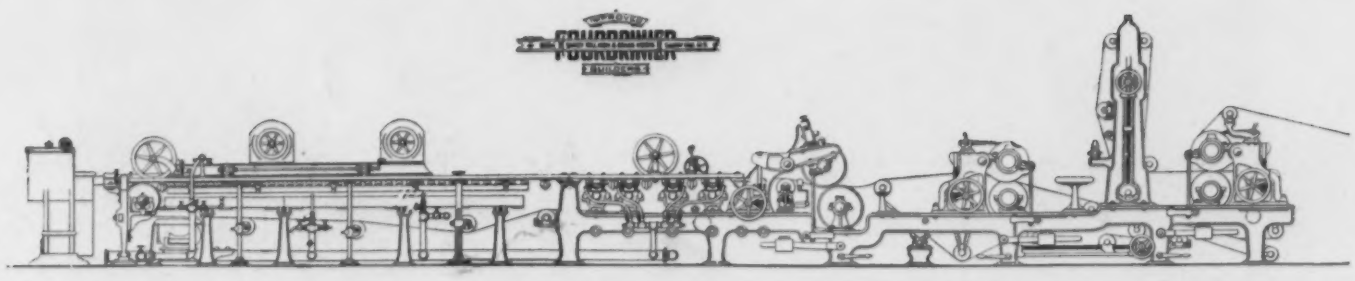




FAN PUMPS.



SANDY HILL, N. Y., U. S. A.

The Sandy Hill Iron and Brass Works,

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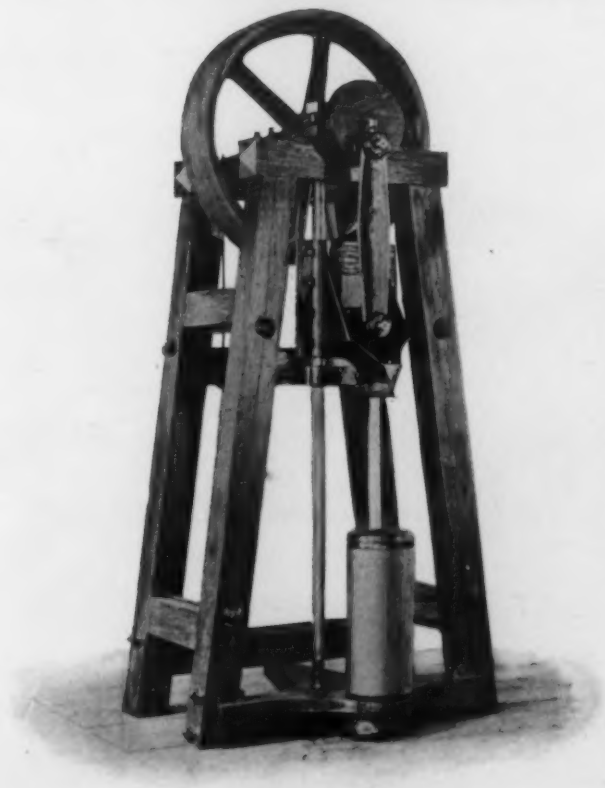
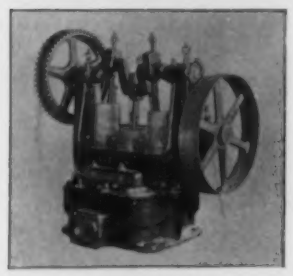


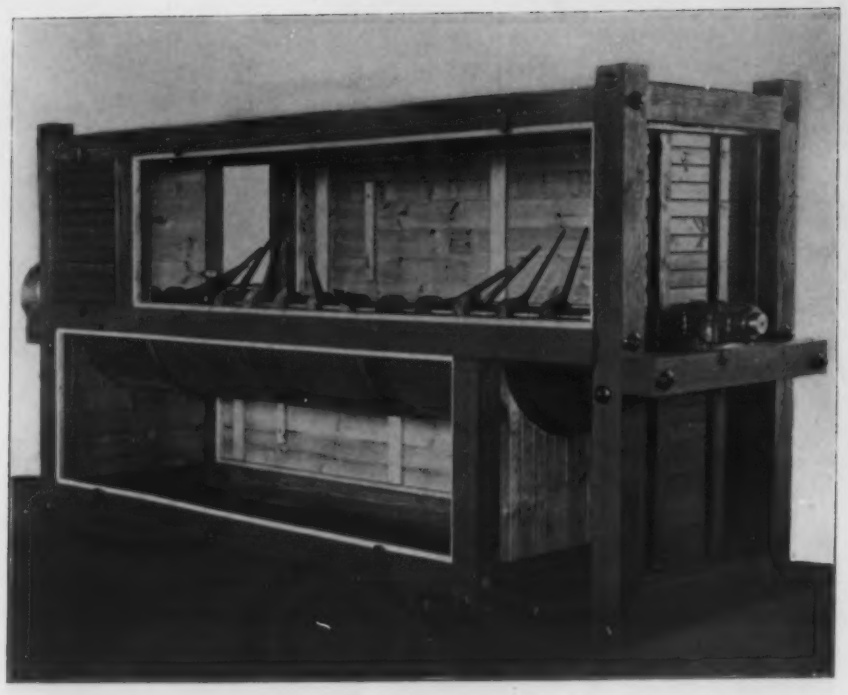
WOOD SPLITTER.

FRICTION CONE PULLEY.



TRIPLEX STUFF PUMP.

WOOD BARKER.



DUSTER.

Sandy Hill, N. Y., U. S. A.

THE use of waxed papers has become so general, and the growth of the business has been so rapid, that the newly invented Surface-Coating Machine is particularly interesting to the trade at this time. There has been considerable experimenting in this line for some time, but there has never been built heretofore a machine that was of practical utility.

C. C. MACBRAIR & Co., of Cincinnati, are the inventors of the new machine, which is in successful operation in their plant.

It has been demonstrated that the surface-coated paper meets all the requirements of the saturated article in almost every instance, and, being much cheaper to manufacture, is rapidly superseding other papers in many lines. It has another great advantage in the fact that the cold application of the paraffine does not discolor the paper as does the melted wax.

The long-felt want of a waxed butcher's Manilla at a low price seems now to be realized, and arrangements are being made whereby the machines will be placed in the paper mills both in this country and abroad. Being so placed the cost of manufacture will be reduced to a minimum. There is so little paraffine required in this process that the expense is merely nominal.

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The WEBSTER System of Steam Heating Vacuum Feed Water Heater and Purifier.

Applicable to old or new, Power Plants
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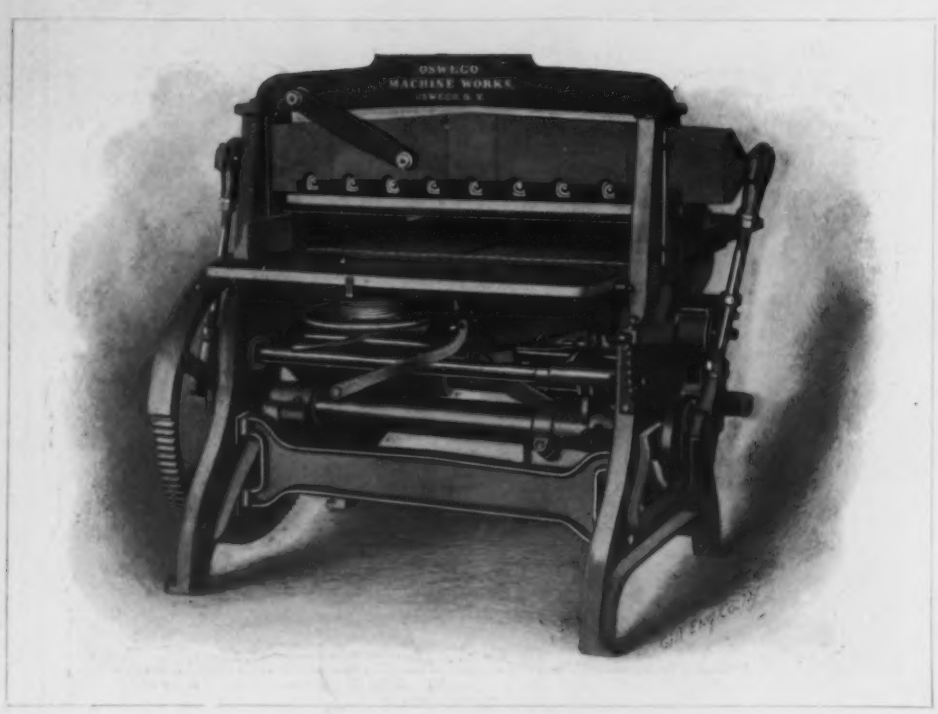

THE WIDESPREAD POPULARITY AND UNIVERSAL RECOGNITION OF THE MERITS OF THE BROWN & CARVER CUTTERS is evidenced by the following names of users and many others.

PAPER MILLS: The Platner & Porter Paper Mfg. Co., Unionville, Conn.
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PAPER DEALERS: Leslie & McAfee, Minneapolis, Minn.
PRINTERS: Dando Printing Co., Philadelphia, Pa.
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Showing compact arrangement for driving the Brown & Carver Cutters with Electric Motor.
NO EXTRA FLOOR SPACE REQUIRED.

Oswego Machine Works,

....Oswego, N. Y.

THE BEATING ENGINE.

AN ILLUSTRATED HISTORY OF ITS DEVELOPMENT FROM THE HOLLANDER.

The Old Stampers—The Principle of the Hollander—The True One—Variations from It—The Main Idea Retained—The Latest Types of Engines as Made by Modern Builders.

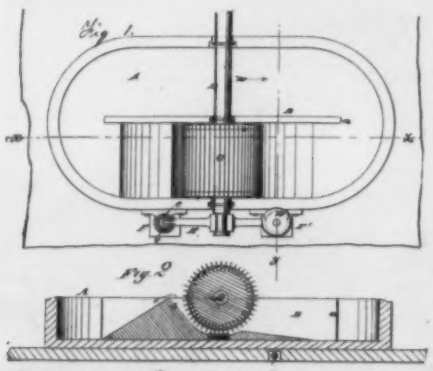
BY GUYON MILLER.

WHILE the manufacture of paper is of very ancient origin, the earliest records which we have of any machine or mechanical device being used for the reduction to pulp from the various substances used in the manufacture of paper is the stamping machine, introduced by the Christians in Toledo and Xativa, Spain, A. D. 1085 to 1151. Munsell, in his "Chronology of the Origin and Progress of Paper and Paper Making," says: "The Christian successors to the Moorish paper makers at Toledo in Spain in 1085 A. D. worked the paper mills to better advantage than their predecessors. Instead of making paper of raw cotton, which is easily recognized by its yellowness and brittleness, they made it of rags, in moulds through which the water ran off.

"In A. D. 1151 the best paper was made in Xativa from raw cotton and rags. The Spaniards, being acquainted with water mills, improved upon the Moorish method of grinding the raw cotton and rags, and by stamping the latter in the mill they produced a better pulp."

Just what the Moorish method of grinding was we are not informed, but prior to 1085 A. D. the only methods of which we have any records were by the use of the hand stamper or pestle in a wooden mortar, the materials being first thoroughly softened by continued soaking in water and fermentation. The Japanese are said to have prepared paper pulp in early times by spreading pulp upon a table and beating it fine with a mallet, perhaps as early as the beginning of the present era.

It is interesting to note at this point that from the very earliest times the process of comminution of the various fibres used in paper making is that of pounding, bruising and beating rather than of grinding, the fibres being thus separated without being cut or broken. This will probably account for the fact that we have no record of the Moorish device or method of grinding paper pulp, and also for the statement that the paper made by the Spanish successors of the Moors was of a far better quality, the Spanish paper being made by the stamping process.



FIGS. 1 AND 2.

Munsell also gives us a cut of the stamping machine of the fifteenth century, in which six sets of stampers of three each were operated in six separate mortars. We are told that the wooden mortars into which these stampers worked were provided with iron plates in the bottom with ribs, and that the ends of the stampers were capped with iron with similar ribs, which matched the ribs in the bottom of the mortar, and that there was a small hole in the bottom of the mortar covered with hair cloth, which allowed the dirty water to drain off, the pulp being retained. A long shaft, with pins opposite each of the levers to which the stampers were attached, raised the ends of the levers as the shaft revolved and dropped them between the guides, causing the stampers to rise and fall at regular intervals into the mortars filled with stock to be pulped. The cut shows a water wheel attached to the end of the shaft, by which the shaft was rotated.

When we consider that this machine represents about 400 years' development of the stamper and that this same machine was used in some form or other until 1750 A. D., a period of about 600 years, as compared with the development in the mechanical arts of a single decade of the present century, we begin to realize the rapid progress of the age in which we are living.

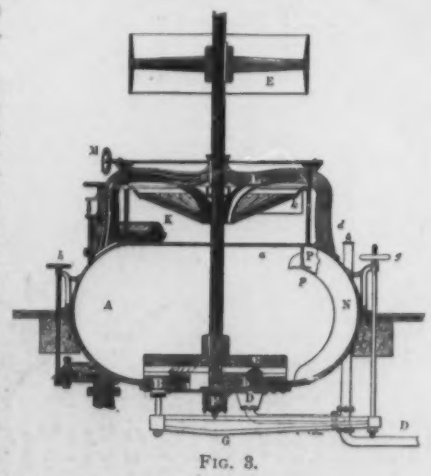


FIG. 3.

About the year 1750, we are told, the Dutch in Holland invented a process of comminuting rags into paper pulp by means of the revolving cylinder armed with metal blades, rotated in close proximity to a stationary plate composed of similar blades, Figs. 1 and 2, between which the paper stock was drawn by the motion of the roll and thereby caused to circulate through a circular or other endless channel, by which it is repeatedly subjected to the action of the revolving cylinder and stationary plate until the proper degree of comminution is attained. This engine, though greatly enlarged and improved, is the Holland engine or Hollander, so largely used at the present day.

We have not been able to learn the name of the inventor of this engine or his residence. Authors all seem to agree, however, that the machine was invented in Holland about the year 1750, but like many other valuable inventions it was not generally introduced for many years afterward. The Dutch inventor, whoever he may have been, evidently hit upon the right principle, as it will be seen that all of the varied forms of beating engines invented and put in practical use since 1750 embody the principle of the revolving cylinder in some form or other, with blades attached, working in connection with stationary blades of a similar character.

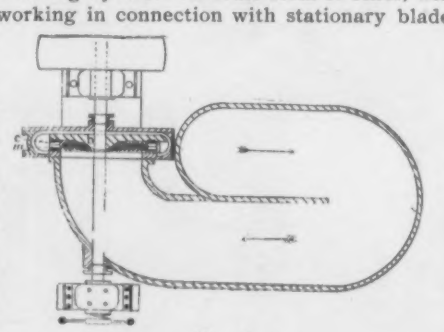
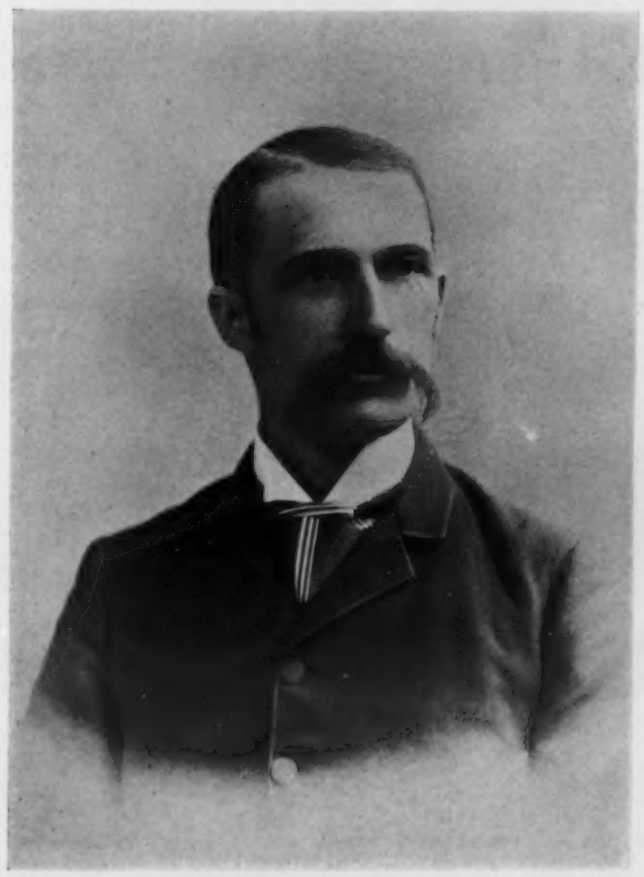


FIG. 4.

The earlier Holland engines were very small machines. In Holland, we are told, they were driven by windmills. In recent years the Hollander has been very greatly enlarged and various patents have been taken out looking to its improvement in many respects.

In 1877 E. D. Jones, of Pittsfield, Mass., patented a device for connecting the lighter bars and raising both ends of the roll simultaneously, commonly known as the double lighter, which principle has come into common use under different modes of construction on almost every form of beating engine now constructed.

In 1882 one Atchinson patented a conical roll for the Holland engine, having its largest diameter next to the outside of the



GUYON MILLER.

engine, where the stock passes under the roll and has the greatest distance to travel before again reaching the knives. From the shape of the tub of the Holland engines, the stock passing the roll next to the midfeather has a much shorter distance to travel than the stock which passes the roll at the outside of the tub. It will therefore naturally be returned to the roll much oftener than the stock at the outside of the tub and will receive much more frequent beating, which will result in making unevenly beaten stock. The conical roll with the correspondingly conical plate is supposed to beat the slow moving stock at the outside of the tub more thoroughly and also give it greater velocity, and thereby compensate for the difference caused by the shape of the tub.

Another inventor has devised a roll with spiral knives, working in connection with a straight bedplate. This roll has a shearing action on the stock, the advantages of which are seriously questioned by many good paper makers; but in the matter of turning the stock in a Holland engine this form of roll certainly has its advantages. The knives are given a lead at the end of the roll next the midfeather, which has a tendency to force the thin stock next the midfeather toward the outside of the tub, causing a cross current in the tub, and greatly hastening the speed of the stock around the outer circle of the tub, the advantages of which will be apparent to every paper maker.

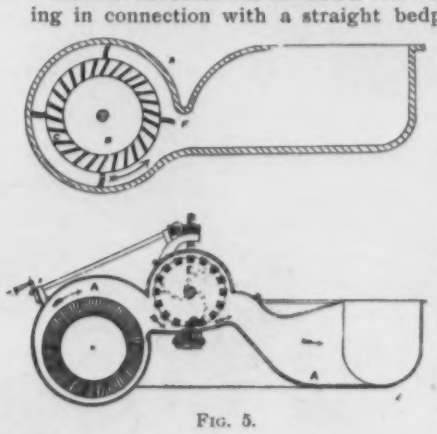


FIG. 5.

For the purpose of increasing production Hollanders have likewise been built with two rolls, one situated on each side of the midfeather. In this case the midfeathers are made wide and hollow, so as to permit of the bearings being placed in the centre of the tub; but all of the improvements in the Hollander are of comparatively recent date. The machine seems to have been used in its original form, with very little change or improvement from its introduction in Holland in 1750 until 1860 or 1870.

In 1871 the Gould engine, Fig. 3, was patented by S. L. Gould, of Skowhegan, Me. The novelty in this engine consists in the spherical shape of the tub, in the bottom of which is placed a stationary circular plate with a number of knives affixed, above which, upon a vertical shaft, a revolving disc is placed, which is also provided with blades so as to cut with a shear-cut action of the blades on the stationary bottom plate. The stock is drawn in through the centre of the revolving disc, passes between the knives and is discharged by the centrifugal force of the disc against the side of the spherical shell, against which the stock passes upward and descends toward the centre, where it is again drawn through the knives. The mixing is very thorough and complete, the stock being left in the tub until the proper degree of comminution is reached. This beater belongs more properly to the class known as refining engines, but with the difference that it is provided with a tub and the stock is furnished in batches. The operation is not continuous, as in the class of engines known particularly as refining engines.

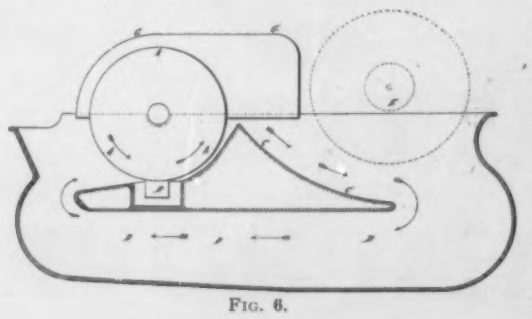
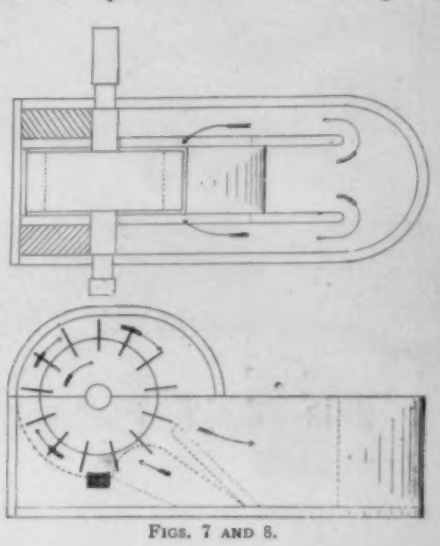


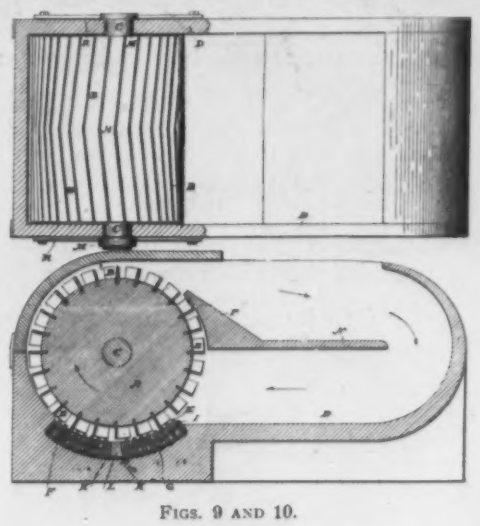
FIG. 6.

An engine somewhat similar in its manner of treating the stock, but differing in the shape of the tub, was invented by Messrs. Cook and Hibbert, Fig. 4, in Richmond, England, in 1878. In the latter the revolving disc and stationary knives are quite similar in their construction, but the disc is mounted on a horizontal in place of a vertical shaft, and the stock after passing the blades is discharged by the centrifugal force on the revolving disc into a tub similar in shape to that of the Holland engine. Fig. 5 represents a later modification of the Cook and Hibbert engine, in which a Hollander roll and bedplate have been introduced in one of the channels of the tub at the point where the stock is discharged from the disc grinders in the end of the tub, which performs an additional beating operation, and is supposed to increase the rapidity with which the stock is beaten off. Both of these latter beaters are limited in their use to the beating of half stock, or stock which has been partially reduced by other previous processes.



FIGS. 7 AND 8.

In 1880 we have the Umpherston, invented by William Umpherston, of Leith, Scotland, Fig. 6. The object of this invention seems to have been to overcome the difficulty previously alluded to in the Hollander, viz., that of the stock nearest the midfeather having a shorter distance to travel through the tub, and therefore making the circuit faster and passing more frequently under the roll than the portion of stock next the outside of the tub and farthest away from the midfeather. In this engine, the stock, after passing the roll, in place of traveling around a vertical midfeather, makes its return to the roll through a passage beneath the backfall and roll to the front end of the tub, where it rises through an opening the full width of the roll and immediately in front of the same. By this means every



FIGS. 9 AND 10.

portion of the stock which passes between the roll and the plate has the same distance to travel in its return passage to the roll, and consequently receives even and uniform treatment. This seems to have been the first real advance made in overcoming the difficulty of uneven circulation in the Holland engine growing out of the peculiar shape of its tub.

With the same object in view, viz., the improvement of the

MILLARD'S

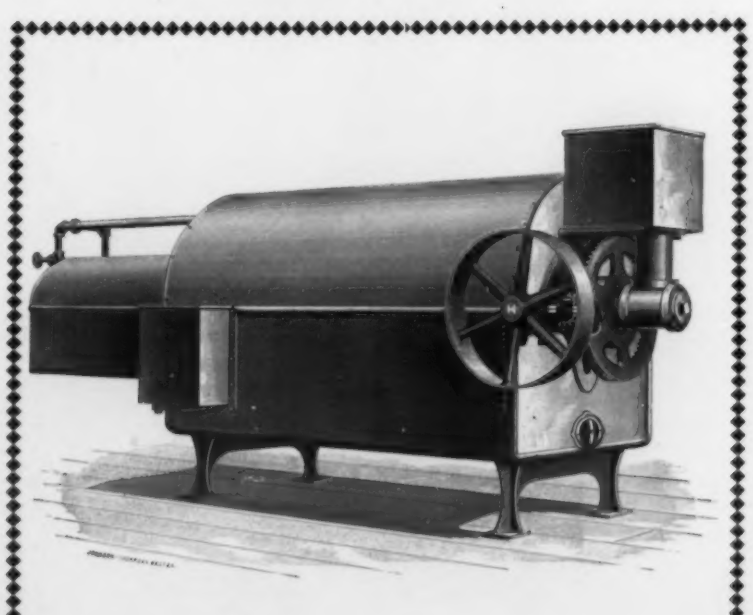
LATEST IMPROVED PULP SCREEN

OVER 100 SOLD DURING THE PAST YEAR.

The Most Prominent and Successful Mills in the Country are Using these Screens.

Users concede the following claims :

It requires no expensive foundations.
It has no wearing parts.
The plates will last for years.
It requires no attention.
One horse-power will drive EIGHT screens.
It is a GRAVITY screen.
It saves stock.
Capacity considered, it is the cheapest screen on the market.
It screens the pulp.



Fabrikanten, welche diesen Knotenfänger benützen, geben zu :

Dass er keines kostspieligen Unterbaues bedarf;

Dass sich seine Theile nicht ausnützen ;

Dass die Sieb-Platten jahrelang halten ;

Dass er keiner Beaufsichtigung bedarf ;

Dass eine Pferdekraft für den Betrieb von ACHT Knotenfängern genügt ;

Dass er ein Gravitations-Knotenfänger ist ;

Dass er Zeug spart ;

Dass, Betreffs Leistungsfähigkeit, es der billigste Knotenfänger ist den es giebt ;

Dass er das Zeug auch wirklich von Unreinigkeiten befreit.

This is the only Screen that will separate all slivers, both fine and coarse, from ground wood pulp.

It is constructed upon a new principle—the Screen revolves instead of oscillating.

It is automatic in its action, receiving the pulp at one end and delivering the slivers at the other perfectly separated.

It saves expense by requiring no attention; it saves stock by carrying no fibre over; it saves power by requiring only one-eighth of a horse-power to drive it.

The Screen plates do not require recutting, and will last for years.

Its operations are noiseless; there are no wearing parts to require replacing, and it screens one hundred per cent. more stock than any other screen.

Dieses ist der einzige Knotenfänger, welcher alle Splitter, feine sowohl wie grobe, aus dem Holzschliff ausscheidet.

Er ist nach einem neuen Prinzip gebaut ; das Sieb dreht sich anstatt zu vibriren.

Er ist selbstthätig, indem er den Holzschliff an einem Ende aufnimmt, und die Splitter vollkommen abgeschieden am andern Ende abgiebt.

Er spart Unkosten, da er keiner Beaufsichtigung bedarf; er spart Zeug, da er keine Faser übertragt; er spart Kraft, indem er nur ein Achtel einer Pferdekraft bedarf.

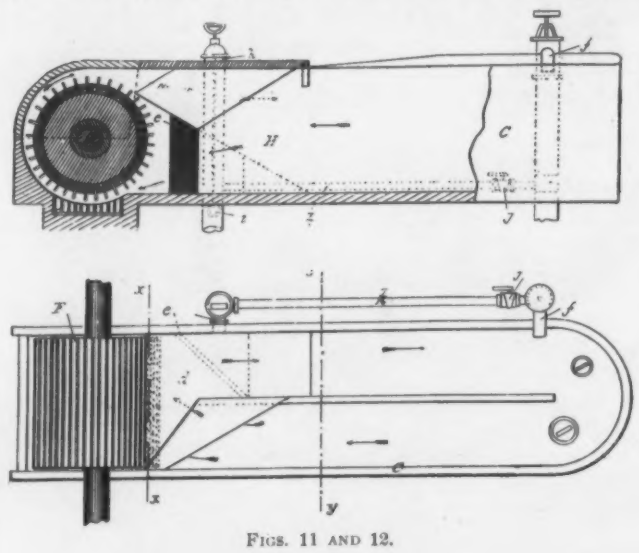
Die Siebplatten brauchen nicht nachgeschnitten werden, und halten jahrelang.

Er arbeitet ohne Geräusch ; keine seiner Theile nützen sich aus und verlange Erneuerung, und er reinigt hundert Prozent mehr Zeug als irgend ein anderer Knotenfänger.

E. F. MILLARD & CO., Sole Manufacturers,

WALTHAM, MASS., U. S. A.

circulation of the stock in the old Hollander and further with a view to increase the rapidity of the circulation, Christopher Crammer, of Turner's Falls, Mass., invented in 1881 the beater represented in Fig. 7 and Fig. 8. There are many novel features in this beater. In the first place the roll travels toward,



FIGS. 11 AND 12.

in place of away from, the backfall. There are two midfeathers with a backfall situated between them. The roll is mounted in one end of the tub between the midfeathers. The plate is placed in the usual position under the roll. The tub being divided by the two midfeathers into three passageways, the stock is fed to the roll from the outside passages through holes cut in the midfeathers beneath the backfall, and is drawn by the blades between the roll and the bedplate, and is then carried by the blades around and over the roll, and discharged into the rear of the tub over the backfall. After passing along the middle passage to the ends of the midfeather, the stock separates,

FIG. 13.

one-half going around the end of each midfeather and along the two outside passageways to the roll. It is claimed that this form of construction increases the rapidity of the circulation many fold over the old Hollander, and very greatly improves the mixing of the stock.

In 1884 John Hoyt, of Manchester, N. H., patented the Hoyt engine, Figs. 9 and 10. In this machine the roll travels toward the backfall, and the stock, after being drawn between the roll and the bedplate, is carried around and over the roll, the same as in the Crammer engine, and is discharged over the top of the backfall. The roll and backfall extend clear across the tub, and the backfall is placed on top of a horizontal midfeather located in the centre of the tub opposite the axes of the roll. The stock, after passing over the top of this midfeather to the other end of the tub, passes around the end of said midfeather and returns under the same and the backfall to the knives, the circulation of the stock being in vertical planes, same as in the Umpherston engine. In this engine it is claimed that a greatly increased speed of circulation is attained, as well as perfect uniformity in the treatment of the stock.

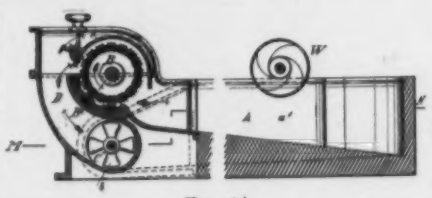


FIG. 14.

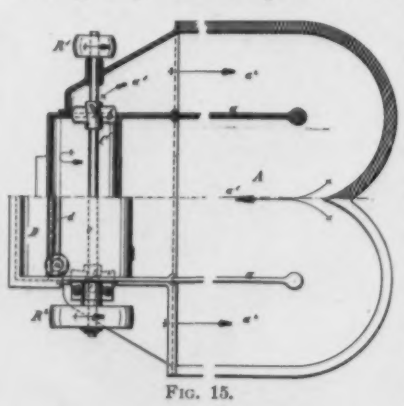


FIG. 15.

In 1886 the Horne engine, Figs. 11 and 12, was invented, patented by J. Horne & Sons, of Lawrence, Mass. The salient features in this engine are the same as those of the Hoyt, the stock being drawn between the roll and the plate at the bottom of the roll, and carried by the blades of the roll around and over the roll and discharged on top of the backfall. From this point the tub is divided by a vertical in place of a horizontal midfeather, and by the curved shape of the backfall the pulp is deflected and turned into one of the passages between the midfeather and the outside of the tub, through which it passes to the opposite end of the tub, where it returns around the end of the midfeather and passes under the backfall to the roll again. In addition to the increased velocity of the stock, it is claimed for this engine that the stock is very thoroughly mixed in being changed from a horizontal to a vertical plane at each circuit around the tub. Immediately following the Horne we have the Emerson engine, Fig. 13, made by the Emerson Manufacturing Company, of Lawrence, Mass., in which the tub is divided by two midfeathers into three

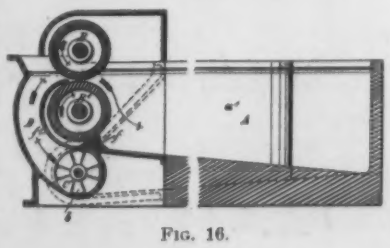
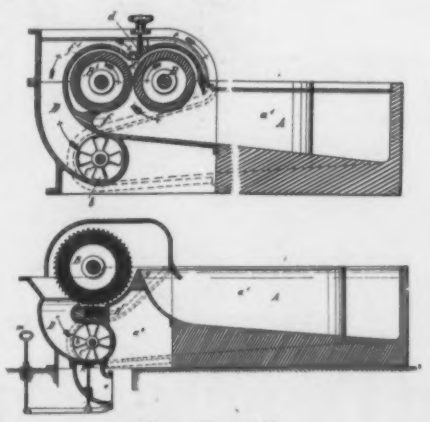


FIG. 16.

passageways, the roll and backfall being mounted between the two midfeathers. The stock, after passing the roll and backfall, same as in the Holland engine, passes between said midfeathers to the rear of the tub, where it separates, returning to the front end of the tub through the two passageways provided by the midfeathers and the outside of the tub, the object of this engine being to divide the currents on their return passage around the outside of the tub for the purpose of overcoming the uneven circulation of the Holland engine. We believe that this engine was originally constructed on the identical lines of the Crammer engine, and was subsequently changed to the form shown in cut No. 14.

A quite novel form of beating engine was invented by Rudolph Kron, Fig. 14 and Fig. 15, of Zurich, Switzerland, in 1887. In this machine the beater roll and bedplates are used simply for the purpose of beating, other means being provided for circulating the stock through the channels of the tub, and the passages of the tub are so arranged that the stock can be easily shut off from the beating roll and caused to circulate through the channels of the tub without coming in contact with the beater knives and plates at all. This is claimed to be a great advantage where quite soft stocks are used and it is desired to use the engine as more of a mixer than a beater, and on the other hand, when required, the entire volume of pulp can be passed between the beater roll and the plates, the stock being propelled by other mechanical device and not by the bars of the roll. It is claimed that greater velocity is attained and thereby the beating capacity of the engine is greatly increased. The tub is divided same as some of the engines already alluded to, into three passageways by two midfeathers, the roll being located between the midfeathers. The stock returns to the roll by the outside passageways. At the terminations of the two outside passages the stock passes through round holes in the midfeathers to the space immediately beneath the roll. In each of these holes is mounted on a horizontal shaft extending through the tub a pair of propellers, which draw the stock through the outer passageways and force it with great rapidity into the space beneath the roll, from which it is driven through a channel to the front of the roll, and passes, if the gateway be open, as is the case when it is desired to use the engine as a beater, between the roll and the bedplates. When the engine is to be used as a mixer, this passage is closed and the stock is forced farther up through an outer channel over the top of the roll and returned to the passageway between the midfeathers at the rear of the roll, thus completing the circuit around the tub.



FIGS. 17 AND 18.

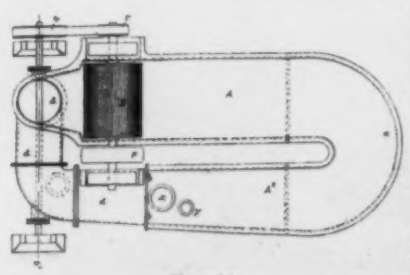


FIG. 19.

Figs. 16 and 17 show a Kron engine with two rolls running together in the same direction at different speeds, one roll taking the place of the bedplates.

Fig. 18 shows a Kron engine constructed as a beater only, all of the stock in this case passing between the roll and the plate.

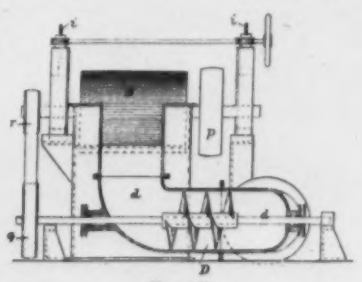


FIG. 20.

The Reed engine, Figs. 19 and 20, patented in England in 1890, also performs the operation of beating and circulating the stock through the tub by different mechanical devices. The beating operation is performed in the usual way by revolving roll and bedplate, but the blades of the roll are not used to propel the stock, the plate being placed only a short distance below the surface of the pulp in the tub. The blades or bars are made much shorter and thinner. After passing the roll, the stock is circulated through the tub and passageway the full width of the roll, at the rear end of which it is contracted and turned into a round pipe through which it is returned to the front of the roll. At this point a propeller is placed in the pipe upon a horizontal shaft, which draws the pulp through the pipe and forces it upward to again be acted upon by the roll. It is claimed that this propeller greatly contributes to the thorough mixing of the stock as well as to increase the circulation, and that a great saving in power is attained by the fact that the roll does not have to lift or propel the stock around the tub; but it is not explained to just what extent this saving in power on the roll is offset by the power required to operate the propeller in the pipe.

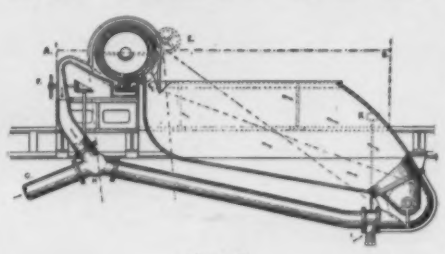


FIG. 21.

The Taylor engine, Fig. 21, is almost identical in its operation with that of the Reed, the construction of the tub being somewhat different, the pulp being returned to the roll by a centrifugal pump located at the rear end of the tub, which discharges the pulp through a pipe and returns it to the front of the roll. In said pipe is located a three-way valve, through which the pulp is discharged very rapidly to the stuff chest.

The Miller Duplex, Fig. 22, patented in 1892, consists of a tub

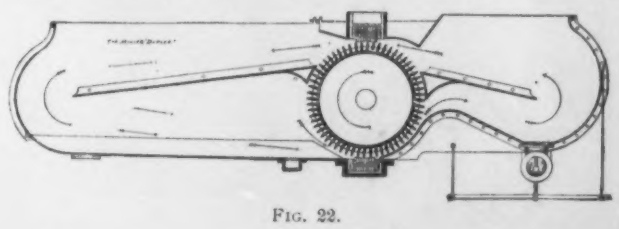


FIG. 22.

divided into upper and lower channels by means of two horizontal midfeathers extending across the tub, one situated at each end of the tub with the roll near the centre, and two bedplates, one situated in the bottom of the tub under the roll, and one at the top of the tub above the roll. By this means a very rapid and thorough circulation is attained, and two separate and distinct beating operations are performed every time that the stock is once circulated around the tub. By this means it is claimed that the beating capacity in this engine is doubled, and by the position of the roll in the centre of the tub, with free escape for the pulp in both directions from the roll as soon as it has been operated upon, all tendency to heat the stock is removed, and owing to the rapid and thorough circulation it is well adapted for either a mixer or bleacher. The roll and top plate are operated with double lighters from one hand wheel which operates both simultaneously, giving to the top plate just double the travel of the roll, which equalizes the distance between the roll and the plates in any and every position of the roll.

Next we have the Pickles compound beating engine, Fig. 23, patented by J. D. Pickles, of Buckland, Conn., which consists of a tub divided by a horizontal partition extending across the tub into upper and lower channels, said channels being connected at the two ends of the tub for the passage of the pulp from the upper to the lower and from the lower to the upper channel, with three beating rolls or cylinders situated in the upper channel and extending across the tub, with bedplates placed beneath the rolls in the dividing partition. Great rapidity in grinding is claimed for this beater from the fact that it has three beating rolls, as well as a perfect and thorough circulation.

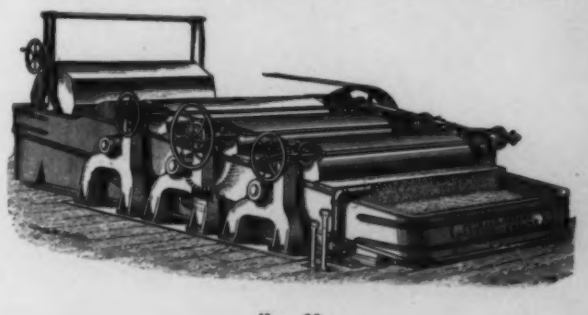


FIG. 23.

Next we will pass to the description of two engines of recent American invention, Figs. 24 and 25, in which the idea of Rudolph Kron, of Zurich, Switzerland, has been revived, viz., the beating of pulp by means of two rolls or cylinders armed with blades and running together in the same direction but at widely differing speeds. Kron makes both of his rolls the same diameter. The American inventors make the roll which takes the place of the bedplate much smaller in diameter than the main beating roll, allowing the larger roll to perform its usual double functions of beating and also propelling the stock. It will be noticed in a number of the foreign engines that the idea of dividing the functions of the beating roll seems to be quite popular, the roll carrying the beating blades being used simply to perform the beating operation, the stock being circulated or propelled through the channels of the tub by various other mechanical devices as already explained.

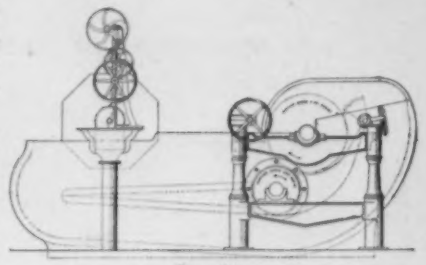


FIG. 24.

The Brown patent beating engine, built by the Beloit Iron Works, Beloit, Wis., Fig. 24, represents the two-roll or revolving bedplate engine, adapted to that class of tub in which the rolls extend across the tub and the stock is circulated in vertical planes through upper and lower channels.

The second cut, Fig. 25, Conley's revolving bedplate engine, patented by Edward Conley, of New York, represents the two-roll revolving bedplate principle applied to the tub of the old Hollander, in which the stock, after passing the rolls,

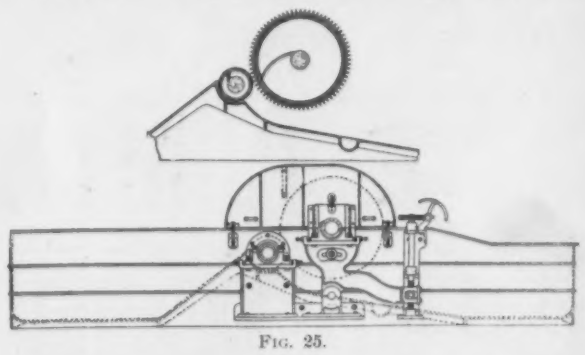


FIG. 25.

is circulated in horizontal planes around a midfeather. A great saving in power and increased capacity are claimed for this engine, as well as a strong and better fibre, from the fact, as

IMPROVED WET MACHINE.

DILTS MACHINE WORKS, FULTON, N. Y., U. S. A.,

MAKERS OF

... Wood Pulp Grinders, Wet Machines and Screens,

BEATING ENGINES with Wood or Iron Tubs, REAM CUTTERS, ROTARY PAPER CUTTERS, REVOLVING REELS, STUFF PUMPS, &c.

Also BEATING ENGINE BARS and BEDPLATES.

...Calender and Press Rolls Reground Promptly.

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Berlin Mills Co., Berlin Mills, N. H.,	24
Racquette River Paper Co., Potsdam, N. Y.,	3
Lyonsdale Paper Mfg. Co., Port Leyden, N. Y.,	2
Bayless Pulp and Paper Co., Binghamton, N. Y.,	1
Outterson Paper Co., Brownville, N. Y.,	2
Riordon Paper Mills, Merritton, Ont.,	3
Fulton Paper Co., Fulton, N. Y.,	6
Goddard Wood Pulp Co., Wendell Depot, Mass.,	1
James P. Lewis, Beaver Falls, N. Y.,	3
Rochester Paper Co., Rochester, N. Y.,	5
Lockport Pulp Co., Lockport, N. Y.,	10
Black River Paper Co., Brownville, N. Y.,	2
Ausable Pulp Co., Troy, N. Y.,	1
Brownville Box and Paper Co., Brownville, N. Y.,	

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Walsh Paper Co.,	Cuyahoga Falls, Ohio.
H. F. Watson Co.,	Erie, Pa.
Newton Falls Paper Co.,	Newton Falls, N. Y.
Riverton Paper Co.,	Riverton, Conn.
J. & J. W. Moyer,	Greig, N. Y.
Victoria Paper Mills Co.,	Fulton, N. Y.
J. P. Lewis Co.,	Beaver Falls, N. Y.
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REAM CUTTER.

ESTABLISHED 1832....

JOHN WALDRON, New Brunswick, N. J.,

MANUFACTURER OF ALL STYLES OF

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Coating Machinery for Lithograph, Label, Fancy, Glazed, Book and Sand Papers.

Dejonge Patent Sheet Coating Machines.

Dejonge Patent Drying Machine for Papers or Other Material in the Sheet.

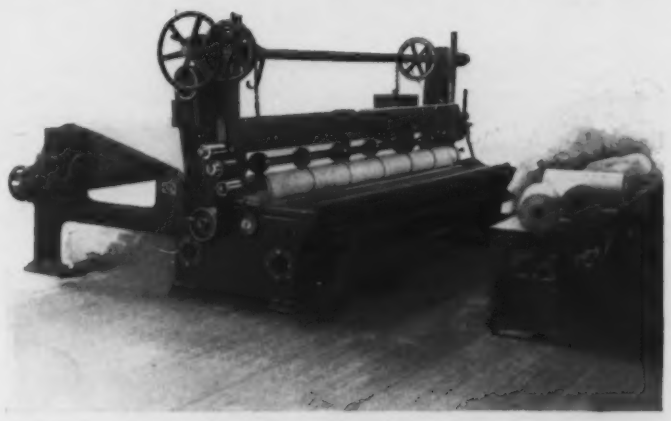
Also Cardboard Machinery, Baryta Coating Machinery, Hilbers, Staib and Waldron Patent Hanging-Up Machines, Patent Power Reeling Machines for Coated Papers and Cardboard, Embossing Machines, Paper Rolls, Polishing Machines, &c.

Machinery is Universally Used by the Manufacturers of above Goods in the United States and Canada.

LARGEST MANUFACTURER OF ABOVE MACHINERY IN THE WORLD.

The Meisel Patent Paper-Mill Slitter and Rewinder.

The increased size of modern paper-mill machinery has created a demand for a slitting and rewinding machine that will handle any sized roll that a paper machine can produce; and as the pioneers in the field of Slitting Machinery, we feel that it is fitting that we should be the first to put on the market a machine that will take rolls of any width (without any limit whatever) and slit and rewind into hard and even rolls of any desired diameter, and of any width from 3 inches upwards. The machine will handle any kind of paper from the thinnest to the heaviest, and the method of winding precludes all danger of breaking the web.



Not until a year's practical demonstration of this machine in a large paper mill has made us so absolutely certain of its merits do we offer it to the general public, with the assurance that we can guarantee it in every respect as a machine that will do an immense amount of work, and give perfect satisfaction.

We cannot here explain all its many points of excellence, but our circular of slitters, which includes a large cut and careful description of this machine, will be mailed upon application.

THE KIDDER PRESS MANUFACTURING CO.,

24 - 34 Norfolk Ave., Boston, Mass.

claimed, that there is less opportunity to cut the fibres than with a stationary bedplate.

The Kelley machine, Fig. 27, of the O. S. Kelley Company, Springfield, Ohio, is designed to accomplish the functions of washing and beating of paper stock by one continuous operation, consisting first of a cylinder, from which the stock passes to the engine, in which are placed four beating cylinders with very wide bedplates, the stock passing continuously from one set of beater knives to the other, from whence it passes to a specially designed refining engine, from which it is claimed that the pulp is discharged in a perfectly cleansed and beaten condition.

Space will not permit us to fully describe and illustrate all of the numerous improvements and varied forms of construction of the beating engine, and as this article is not intended as an advertisement of any particular make we hope that we will be pardoned for numerous omissions. Our object has simply been to show as many as possible of the improvements made in the development of the beating engine in adapting it to the requirements of the rapid progress being made in the paper industry.

SOME EARLY WISCONSIN MILLS.

The First Plant in the State Was Located at Milwaukee.

In 1846 Livingston & Garland built the first mill in the State of Wisconsin. It was located at the city of Milwaukee, at the junction of the Milwaukee and Menomonee rivers. It contained two engines and a cylinder machine, was operated by steam, and ran on printing and wrapping papers. In 1851 the property was sold to the Milwaukee and St. Paul Railway Company, and was converted into a warehouse.

The machinery was bought by Noonan & NcNab, who in 1850 built a mill at Humboldt, a place three miles north of Milwaukee. In it they had two engines and a 42-inch cylinder machine, the latter of which was constructed by Goddard & Rice, of Worcester, and was set up by a son of the senior member of the firm. The bank of the river upon which the mill stood had so acute a declivity that the engine room, which was upon the upper level, was about one and a half stories above the machine room, which was upon the lower level. The stuff chest was in the machine room, its bottom about a foot above the top of the vat, yet the top of the chest was actually below the engines.

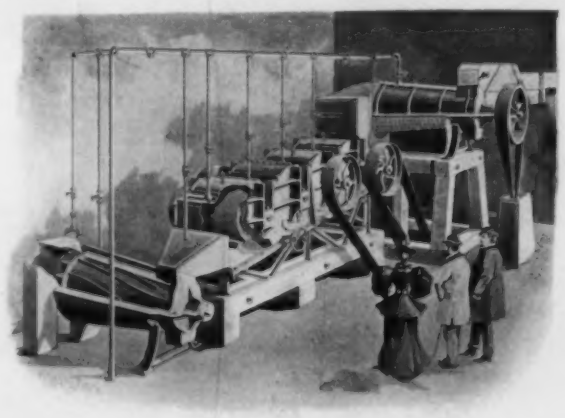


Fig. 27.

Because of that arrangement no stuff pump was used. An old-fashioned molasses faucet, working upon a hinge-like slide, was inserted inside of the chest near the bottom and the stuff for the machine was drawn through that faucet and dropped into the mixing box. It required considerable experience to regulate the faucet and make the paper of a uniform thickness. When the stuff chest was full a large quantity of stuff was forced through the opening, and as the quantity of stuff in the chest decreased the faucet had to be gradually opened again, requiring adjustment whenever an engine of new stuff was emptied into the chest. The mill was operated until 1867, when the dam was washed away.

In 1855 Ernest Prieger built a mill on the Menomonee River, four miles west of Milwaukee. Later this mill was owned by Noonan & McNab, but in 1874 it was totally destroyed by fire.

Alexander Mills, a mechanical engineer of St. Charles, Ill., built a paper mill at Milwaukee in 1864. It was built on scientific principles, and when it was started it was found wanting in practical condition. It was run for about two years, and then one of its boilers, also constructed on scientific theories, exploded and blew the mill to pieces. Some portions of the mill were afterward removed to Marseilles, Ill.

G. N. Richmond & Brother, both of whom had learned their trade with Butler & Hunt, started a mill at Appleton in 1853. It contained two engines and a 36-inch cylinder machine and made wrapping paper. Two pulp mills were started in the early seventies at the same place, one by Bradner Smith & Co., of Chicago, and the other by the Ames Wood Pulp Company. Together they had a daily output of 8,000 pounds of dry pulp, which at that time was a large product.

The Messrs. Kehlors built a paper mill at Waterford, Wis., about the time that the Richmonds began, but later the plant was abandoned.

In 1855 Wright, Merrill & Newcombe erected at Beloit a mill containing four engines and a 42-inch cylinder machine to make news. This mill was afterward owned by the Rocky River Paper Company. In 1857 S. T. Merrill built a second mill at Beloit, and this one contained six engines and two machines. Two years later he changed a saw mill into a paper mill and all three of his mills subsequently passed into the hands of the Beloit Straw Board Company. Beloit is accredited with being the place where the first building board was manufactured.

F. N. Davis & Co. also had a mill at Beloit, where they ran on specialties, one of which was a rye strawboard subjected to a chemical process. This product was known as a "patent aluminum paper board." It was printed up with oil cloth designs and was used as a floor covering.

In 1869 L. J. Mathers built a mill at Sparta, where he made straw wrapping paper. The mill had three engines and a 48-inch cylinder machine.

At Fond du Lac two mills were built within a year of each other. The first was erected in 1871 by George Hunter, and the second in 1872 by Nightingale, Bostworth & Co.

THE FOX RIVER VALLEY.

THE GREAT GROWTH OF PAPER MANUFACTURING THERE.

The Early Beginnings—Straw Paper the First Product Made—Now the Output Consists of All Grades, Including Loft-Dried Writings.

By J. A. KIMBERLY.

"PROGRESS" and "Prosperity" were the mottoes that the paper makers of Wisconsin had nailed to the mast prior to 1893, and the substantial bank accounts and regular dividends were evidence that they had well chosen. The depression that hangs so like a cloud over all manufactories at the present time makes no exception of the paper trade, and still owners struggle along, hoping for an early and beneficial change. The growth of expensive mill properties has come to a halt owing to the declining values of the product, making it apparent that they are no longer interest producers, let alone profitable investments.

It may be pleasant to turn from the burdened conditions of 1897 and go back to the earlier years of paper making in this part of the Great West, and trace from the small beginning along these years of prosperity to the present.

Away back in the sixties a few paper mills were scattered over the State, making wrapping paper from straw, which a little later began making, as the demand was created, a rag print paper, and sold it direct to the weekly papers. But this crude sheet would not be recognized to-day as printing stock.

Such a mill was the Neenah Paper Mill, built in 1865 and started under the management of Colonel Haynes, one of the pioneer paper makers of Wisconsin. Later this was changed to a rag-print mill.

The first venture proving profitable, it attracted the attention of those parties who later formed the firm of Kimberly, Clark & Co., who in April, 1872 (twenty-five years ago), undertook what was then considered a wild venture, broke ground and erected their Globe Mill—the first paper mill in the State fitted to make print and book papers entirely from rags. Colonel Haynes left the Neenah Paper Mill and became foreman of Kimberly, Clark & Co.'s mill, and was retained in this responsible position until his death, many years later.

This mill was started on October 22, making its first sheet of rag print, and glorying in making about 2 tons of paper a day on a 72-inch single-cylinder machine. This mill has run continuously since, being now equipped with a Fourdrinier machine, and has a daily run of 8 tons.

A market was found in Chicago and Milwaukee for the product, and as the demand increased, Kimberly, Clark & Co. (in 1874) purchased the Neenah Paper Mill and ran both mills in one interest. This Neenah Paper Mill was in 1885 torn down and the present two-machine book mill was built on the site.

First Ground-Wood Paper in Wisconsin.

From this pioneer beginning this firm reached out to Appleton and built, in 1879, the large three-machine manilla mill of the Atlas Paper Company, combining with it a large ground-wood mill. Here the first paper made largely from ground or mechanical pulp in the State was made. Here commenced the war to demonstrate to the consumer that wood manilla could take the place of jute papers, so largely used, and furnished entirely from Ohio. This mill was burned in 1888, and in five months started up anew and has been a continuous producer up to this time.

Here, too, were made the initial experiments to demonstrate the value of de-oxidized bronze as a metal to use unlined for the manufacture of sulphite fibre, and the Atlas company set up and ran the first digester made from this metal. From the first it was successful and one of the digesters is still running, making its regular output of fibre. Later the brick and lead lining proving cheaper it displaced the unlined digesters, and they are a thing of the past, yet should not be forgotten, as they played an important part in the development of the great and important industry of sulphite making in the States.

Following this the Vulcan Mill was built, the first strictly book mill fitted to make the super-calendered book grades. This mill was built at Appleton, adjoining the Atlas property, and later the Tioga Mill was added, making three machines on super book. These are now the old mills of the valley, having changed but little during their busy life.

In 1884 the Badger Mill was built at Neenah for running high-grade manilla and No. 1 rag print. Later (in 1887) the Telulah Mill was built at Appleton and fitted for specialties in book and colors. Its two machines have been the busiest in the city.

In 1889 a departure was made by the firm purchasing all the power at what is now the village of Kimberly (3 miles from Appleton) and putting into the hands of A. B. Tower, of Holyoke, the planning of a large three-machine print mill, with fully equipped ground-wood and sulphite departments. Under the immediate supervision of this "prince of paper-mill architects" a modern plant was erected, and few, if any, in the States can compare with it, complete as it is with its three large machines, twelve grinders and 30-ton sulphite department.

Last, but by no means least, of our ventures was the building, again from Mr. Tower's plan, at De Pere, of the finest and largest paper mill in the West fitted to make high-grade, loft-dried writing paper. Built in 1891, it only got into the market when the '93 panic made the work of introducing new grades a heavy burden. So far its work has been very satisfactory, and it has been successful in gaining a reputation second to none in the land. It has never shut down a week for want of orders, demonstrating that fine writing can be made as well and as good in the Western as in the Eastern States. This mill was called the Shattuck & Babcock Company, after two of the officers of the Kimberly & Clark Company.

These mills have to a great extent been handled in one common interest, and are a record of the work and growth of twenty-five years of paper making by this one firm. Don't imagine while I have dwelt only on the building of the Kimberly & Clark Company's mills (inasmuch as this, too, is their silver anniversary year) that others who have come in have not kept pace and built and run large paper-mill plants as well.

The growth with the Kimberly & Clark Company from the Globe Mill, with its 2 tons daily product, to its present fourteen mills and daily product of 150 tons demonstrates the healthy growth and increased consumption of paper all within the twenty-five years from 1872 to 1897, and is of itself the history of the paper industry in Wisconsin and is not to be overlooked. It also is an object lesson of the rapid growth of the Great West.

While this is the work of one firm only, the names of the Davises, with their Winnebago and Dells paper mills; of Frank Russell and J. A. Kimberly, Jr., running the Neenah Paper Company; Gilberts, of Menasha, with their large book mill; Geo. A. Whiting and his associates, handling their mills at Menasha and their newer plants at Stevens Point and Plover; Fox River Paper Company, with their three mills at Appleton, running on machine writings and book papers; Mr. Patten and Mr. McNaughton, who are among the pioneers, with their mills at Appleton and Kaukauna and their interests on the Wisconsin; Van Nortwicks, with their interests at Combined Locks and Kaukauna; Col. H. A. Frambach, with others, owning the Badger Paper Company, of Kaukauna, and the Quinnesec properties; Mr. Thilmany, of Kaukauna; the large mills of the Marinette and Menominee Paper Company, with the Falls Manufacturing Company, of Oconto, finish the long list of the older mills, while the magnificent water power recently developed on the Wisconsin River has added the Nekoosa, Centralia, Grand Rapids, John Edwards, and Tomahawk paper companies, which, with the Park Falls Pulp and Paper Company, closes the list of the mills built and being operated at present in the valleys of the Fox and Wisconsin rivers.

J. A. Kimberly.

The enterprise of such firms and men as operate these fine properties is recognized all over the land.

From a financial standpoint, the history of our Wisconsin mills is fully as interesting as the development of the paper industry. The old Globe we built in 1872 was equipped for about $30,000, and now it can readily be shown that hard on to $20,000,000 is represented in paper, fibre and pulp-mill industries in our State—a creditable showing for a quarter century's work. I can point to fewer financial reverses among the paper makers than in any other one of our varied manufacturing industries.

Superintendents Who Have Been Factors.

While speaking with a degree of pride of the proprietors and owners of these mills, I would not forget nor fail to mention the superintendents who have worked so faithfully in all these years, and whose energy has made its mark on this great development. Among these P. R. Thom, Thos. Pearson, S. R. Wagg, Mr. McLaughlin, Mr. Escott, Mr. Bowman and a host of others deserve special mention.

With this work of paper-mill building and the finishing of this immense product, sulphite making has its important part, and large mills have come in and supply the steady demand for their products. These are represented by A. L. Smith, Jr., who manages the plant of the Manufacturing Investment Company; Bev. Murphy, at the head of the Riverside Fibre Company, and Mr. Brokaw, who handles his own mill at Kaukauna. Many large paper mills have their own sulphite plants, especially those making the lower grades of news.

From the handful of men employed in the earlier 1872, we to-day can turn out a small army of faithful, hard-working men and women, intelligent, well read and happy; better satisfied or more willing workers it will be hard to find, and while the numbers have increased, the pay roll has kept pace and national banks are called upon heavily on monthly pay days.

So much for a history of Wisconsin in the paper industry only from a mechanical and financial standpoint. When one stops to think of the influence of the intelligence that has gone out to the world printed on the output of all these mills, one can never fathom it. It is very much like the Great Eternity.

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CHARLES S. BARTON,
PRESIDENT AND TREASURER.

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in 1837.

MACHINE & IRON CO.,

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S. A.

GEORGE B. WITTER,
SECRETARY.

of FOURDRINIER and CYLINDER

MACHINES.

Hill Patent Square and Cutters.

Solicited . . . . . .

The Heintz Steam Saver.

WILLIAM S. HAINES, Sole Manufacturer for the United States and Canada,

146 South 4th Street, PHILADELPHIA.

AGENTS.

WESTERN STEAM APPLIANCE AGENCY,
300 Franklin Street, CHICAGO.

CHARLES F. CHASE,
26 Milk Street, BOSTON.

EDMUND MATHER,
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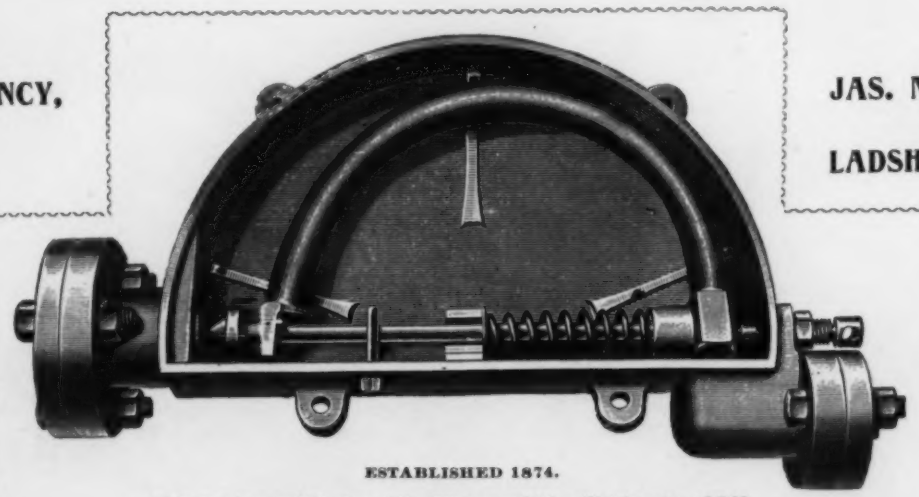
HARRIS ALLAN,
ST. JOHN, N. B.



ESTABLISHED 1874.

This Cut is one-fifth size of No. VI trap, which will take care of 240 gallons of water per minute at 197 degrees temperature.

AGENTS.

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H. DUDLEY COLEMAN,
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D. W. CLEM & CO.,
CHATTANOOGA, TENN.

We now have records showing a saving of sixty-six per cent. full, and there are others to hear from. The end is not yet.

DO YOU KNOW OF ANY OTHER INVESTMENT THAT WILL PAY

A HUNDRED Per Cent. a Month?

We have furnished the Heintz Steam Savers to

P. C. CHENEY CO.
AMOSKEAG PAPER CO.
RUMFORD FALLS PAPER CO.
OTIS FALLS PAPER CO.
POLAND PAPER CO.
PIEDMONT PAPER AND PULP CO.
S. D. WARREN & CO.
HOLLINGSWORTH & WHITNEY CO.
HOLLINGSWORTH & VOSE CO.
GEO. W. WHEELWRIGHT PAPER CO.
DILL & COLLINS.
UNION BAG AND PAPER CO.
UNION SANDPAPER CO.

ALL WITHIN A FEW MONTHS.

SPECIAL TRAPS FOR HANDLING ALKALINE WATER.

THE PULP GRINDER.

CHANGES MADE IN IT BY AMERICAN BUILDERS.

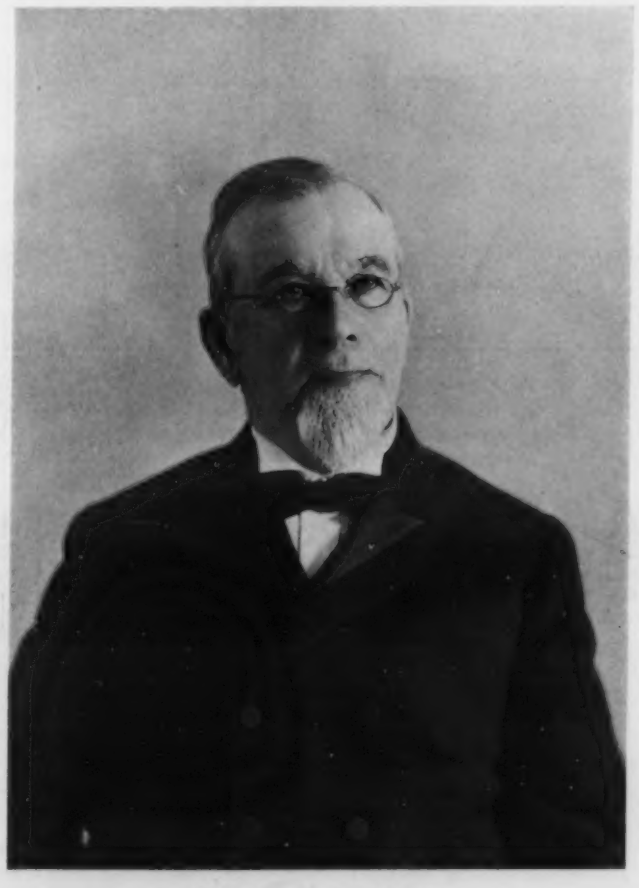
The Old-Style Voelter Machine—The Number of Pockets—Some Old Machines, the Existence of Which Is Known to Manufacturers Only by Orders for Repairs—Hydraulic Machines—The Work of Warren Curtis—The Question of Moisture.

By Hon. GEORGE A. BAGLEY.

IN 1869 Hon. Warner Miller, of Herkimer, N. Y., shipped to the Bagley & Sewall Company, of Watertown, N. Y., a Voelter pulp grinder, accompanying it with the instructions to manufacture a machine similar in design. The machine had three pockets and the new machine was to have five pockets. This change in the number of pockets necessitated the making of new patterns. This was done, and these patterns were, I believe, the first made in this country. The grinder had a stone 48 inches in diameter and 17 inches face; the feed employed was by a screw and worm gear and was naturally slow in its action.

When the pocket was filled with wood the feed was brought into operation by the movement of a hand lever which controlled the worm gear and screw. The feed could only travel at a uniform speed, and when the wood in the pocket was ground out the lever was moved and the plunger began its return travel. This first grinder was mounted on shafts 4 inches in diameter and turned down to 3¼ inches. This machine was completed and shipped and worked so satisfactorily that orders came in for more.

The next noticeable change that took place in the construction of grinders was the increase in number of pockets;



Hon. George A. Bagley.

originally, as noted, the pockets were three in number, then five were used, then seven and then eight, and the reason for the change and the increase in the number of pockets can be readily understood when it is stated that the grinders in those early days only turned out from 1,200 to 1,500 pounds of wood pulp in twenty-four hours. The increase in number of pockets of course enlarged the product. The main reason, however, why a greater number of pockets was desired, and consequently a greater amount of product was acquired, was that a royalty of $5 (or thereabouts) per stone per twenty-four hours was paid by all users outside of the patentees or owners of the Voelter patents.

Several hundreds of these Voelter grinders were made in Watertown and shipped to various parts of the country; one or two of them are yet running in the State of Washington, their use and existence being only known because of the occasional inquiries for repairs.

With these exceptions all these old-style grinders have been superseded by the larger and better devised hydraulic feed grinders, which were first used about 1885 by Warren Curtis. The hydraulic feed grinder, as it was built by us in 1887, has undergone many changes and improvements. At first the cylinders were made 5 inches in diameter, then 6 inches, as in the "Mills" grinder, then 7, then 10, then 12, and finally 16 inches. This increase in pressure, which acted simultaneously as well as automatically, necessitated other changes. Shafts had to be enlarged, until at present forged shafts 7½ inches in diameter are used. Upon these are now mounted stones having 24 inches face and being 54 inches in diameter. The pressure in pulp grinders has grown from 25 pounds to the square inch to 100 pounds to the square inch, and the product of a stone has increased from 1,200 pounds of wood pulp in twenty-four hours to 10 tons in twenty-four hours.

The hydraulic pulp grinder also necessitated the use of other devices, such as pumps, etc. These were all carefully studied out so as to bring their efficiency up to that required by the improvements in the grinders.

Later came another necessity, not so much in the manufacture of pulp as in the methods of decreasing the moisture in order to save rates in shipping. In those early days ground wood was shipped 25 to 30 per cent. dry and the apparatus used to eliminate the water was a simple press. Later a wet machine was invented at Watertown. The pressure necessary to squeeze the water from the pulp was controlled by screws and springs located each at the end of the roller and operated by hand. Moisture in a sheet of pulp varied, as it was an exceptional thing to have the screw and springs set exactly the same. This variable degree of moisture was decidedly objectionable, as it was the foundation for claims which purchasers were not slow to make on the pulp makers. Later a hydraulic pressure wet machine was patented in Watertown, which is a decided improvement over the old style. It is self-contained automatic, producing a pulp not only 50 per cent. dry, but also of a uniform dryness from car to car and day in and day out.

Paper Prices in 1816.

For some years after the erection of General Joseph Markle's first mill at West Newton, Pa., Pittsburg was the principal Western depot for the sale of all kinds of paper. The following advertisement is from Cramer's "Pittsburg Almanac" for 1816:

"Cramer, Spear & Eichbaum, booksellers and stationers, at the Franklin Head book store, Market street, having their paper mill in complete operation, will be enabled to furnish at all times the following sizes and qualities of paper on the following terms:

Royal writing, ream	$22.00
Medium writing, best quality	18.00
Medium writing, second quality	14.00
Demi writing	16.00
Folio post	9.00
Quarto post	4.50
Fancy post	5.00
Foolscap No. 1	4.50
Foolscap retree	4.00
Foolscap No. 2	4.00
Foolscap retree	3.50
Foolscap No. 3	3.50
Foolscap retree	3.25
Medium wrapping	2.75
Crown wrapping	2.25
Foolscap wrapping	1.75
Bonnet boards, per gross	9.50
Fuller's boards, per pound	25 to 33½c.

Matthias Koops' Book.

In 1800 Matthias Koops, who was not only a paper maker but a writer who told an interesting story, published in London a book, the title of which is "Historical Account of the Substances Which Have Been Used to Describe Events, and to Convey Ideas, From the Earliest Date to the Invention of Paper." The first edition of the book was printed on paper made solely from straw, the frontispiece being an engraving depicting the Egyptian papyrus.

In 1801 Koops issued a second edition of his work. This edition was printed in two parts, the book of one being printed on paper made solely from straw, with an appendix of twenty pages, of which latter he says:

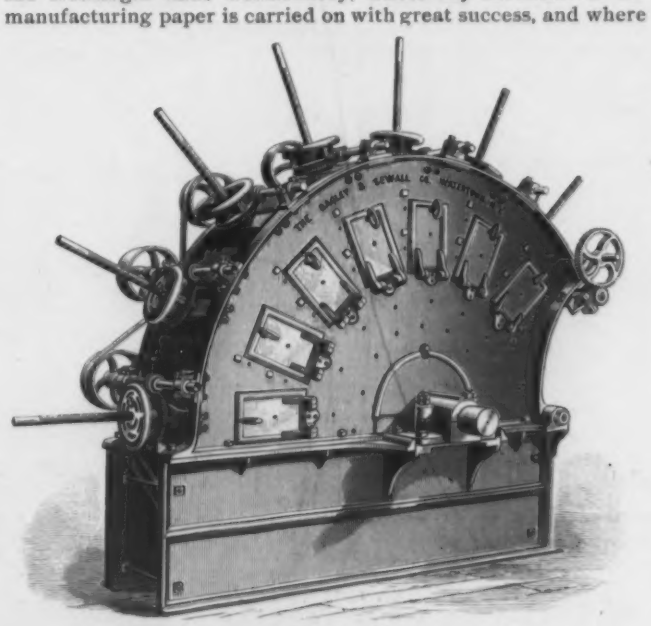
"The following lines are printed upon paper made from wood alone, the produce of this country (England), without any admixture of rags, waste paper, bark, straw or any other vegetable substance from which paper might be or has hitherto been manufactured, and of this the most ample testimony can be given, if necessary.

The book made up of the second part of the edition was printed upon paper made from old printed and written paper, the appendix, as before, being upon wood paper.

Koops dedicated his book to "His Most Excellent Majesty, George the Third," by whom he had been granted patents "for extracting printing and writing ink from waste paper by reducing it to a pulp, and converting it into white paper, fit for writing, printing and for other purposes; and also for manufacturing paper from straw, hay, thistles, waste and refuse of hemp and flax and different kinds of wood and bark, fit for printing and almost all other purposes for which paper is used."

That his patented processes were put into actual operation may be seen not only from the book itself, but also by this quotation from the work:

"I have had the satisfaction to witness the establishment of an extensive paper manufactory, since the 1st of May, 1800, at the Neckinger Mill, Bermondsey, where my invention of remanufacturing paper is carried on with great success, and where



Seven-Pocket Pulp Grinder.

there are already more than 700 reams weekly manufactured, of perfectly clean and white paper, made without any addition of rags, from old waste written and printed paper."

SURFACE-COATED PAPERS.

THE HISTORY OF THEIR MANUFACTURE IN AMERICA.

The Early Days of the Business—The "Old Rigging House," the Birthplace of American Methodism and of the American Surface-Coated Paper Trade—Changes in the Methods of Manufacture—The Colors—A Comparison with Foreign Papers.

By ETHAN ALLEN DOTY.

MY earliest recollection of the surface-coated paper business carries me back to my schoolboy days, when, on the Saturday half holiday, I was permitted to visit my father's store in the "old Rigging House" in William street, and watch the clerks there who packed the bright-colored papers. This was indeed the infancy of the trade. My father, Warren S. Doty, who had come to New York a few years before, formed, in 1839, a partnership with a Mr. Pollock under the firm name of Pollock & Doty, the purpose of which was to carry on the business of engraving and printing from copper and steel plates. This was before the advent of lithography here, and a considerable part of their business was to print labels for the print works, the cotton mills, and for proprietary medicines. Their salesroom was in John street, opposite Dutch street, the printing being done in a loft.

Very soon they found it desirable to print these labels on paper with a colored coated ground or face, and to produce these papers the firm established a small factory in a loft in Spruce street, and here the paper, in ream or two-ream packages, was coated sheet by sheet, the color being brushed on it

Ethan Allen Doty.

by girls, whose aprons and dresses were covered with blotches of all sorts of colors; then the sheets were hung on laths which rested on wooden racks, tier above tier, where they remained over night—sometimes longer—to dry. I do not remember much machinery in this loft. There was a plating machine and a screw press, the papers desired for the firm's work requiring only a plated finish. This, I think, was the earliest attempt to manufacture surface-coated papers in this country, and it was continued in this way for several years.

The trade, however, began to develop. Geo. J. Kraft, who had been making and importing fancy boxes, began to import these papers for general use, and soon established a fine and extensive trade. A German named Dobler started manufacturing in a small way at first in Nashua, N. H., but later formed the firm of Dobler & Bott, at Albany, N. Y., which was afterward succeeded by the Albany Card and Paper Company. Some of the parties at Nashua also formed the Nashua Card and Glazed Paper Company, and both companies did a large and prosperous business from their organization. Another importing house in these early days was Ferd. Ernst & Co., who came to grief, however, soon after the panic of 1857.

In 1845 my father went into partnership with Peter G. Bergen, the firm being Doty & Bergen. Mr. Bergen had built a factory near his residence in Gowanus, at Eighteenth street, near Third avenue, Brooklyn, and here, with a German color maker named Pollock, had made a larger variety of papers than my father had attempted in Spruce street. Both factories were now consolidated, and the business was carried on successfully for many years.

I do not know whether there was much money in that old factory, but life there appeared to be very pleasant. The building stood on the sloping shore of Gowanus Bay, fanned by the winds fresh from the ocean. On Saturdays I could always find somebody to take me out on the bay in a lifeboat that Mr.

ADIRONDACK MACHINE CO.,

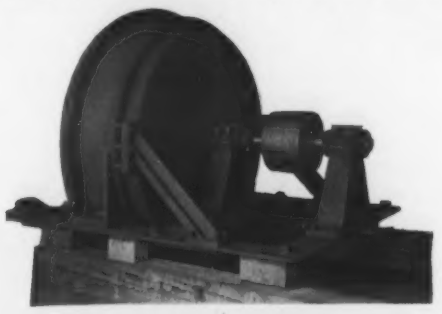
ENGINEERS, FOUNDERS AND MACHINISTS,

CARTHAGE, N. Y., U. S. A.

Manufacturers of Ground-wood and Sulphite Mill Machinery; as Barkers, Splitters, Chippers, Chip Crushers, Chip Screens, Chip Sorters; Acid Plants, complete (milk of lime or limestone system) or parts of same, as Sulphur Ovens, Cooling Boxes, Bronze Agitators, etc. Iron and Bronze Pumps, Rotary Screens for Ground Wood and Sulphite Fibre. Diaphragm Screens, Wet Machines, Wet Machine Attachments, etc.

BARKER.

CHIPPER.



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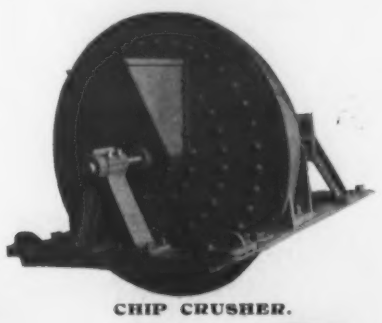

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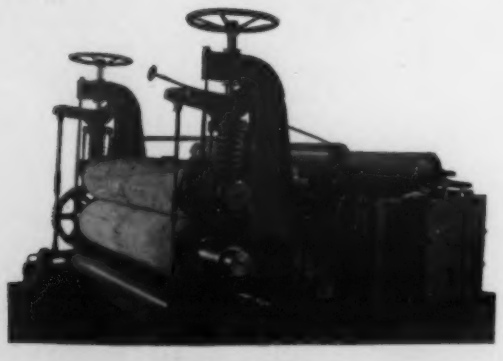
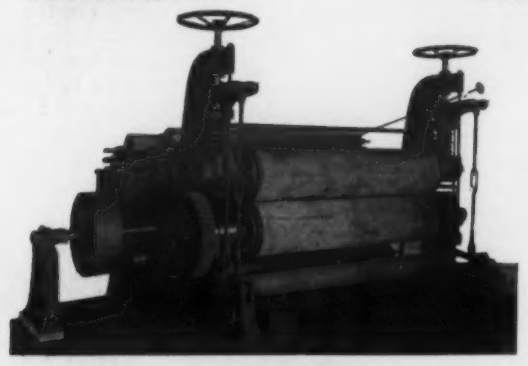


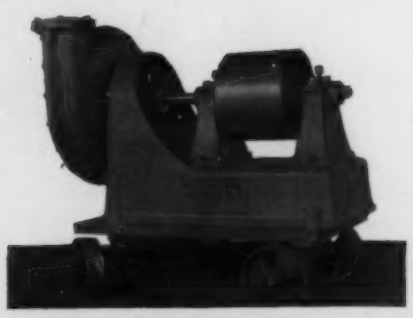
WET MACHINE

WET MACHINE ATTACHMENT.

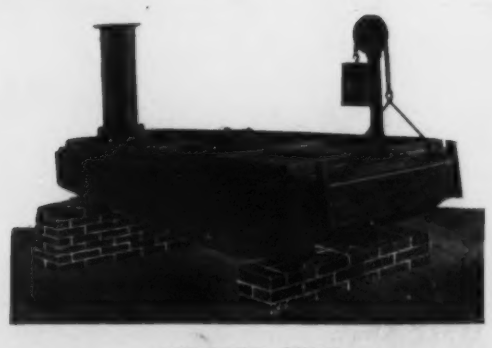


WET MACHINE.

SPLITTER.



PUMPS.



SULPHUR OVEN.

CHIP SCREEN.

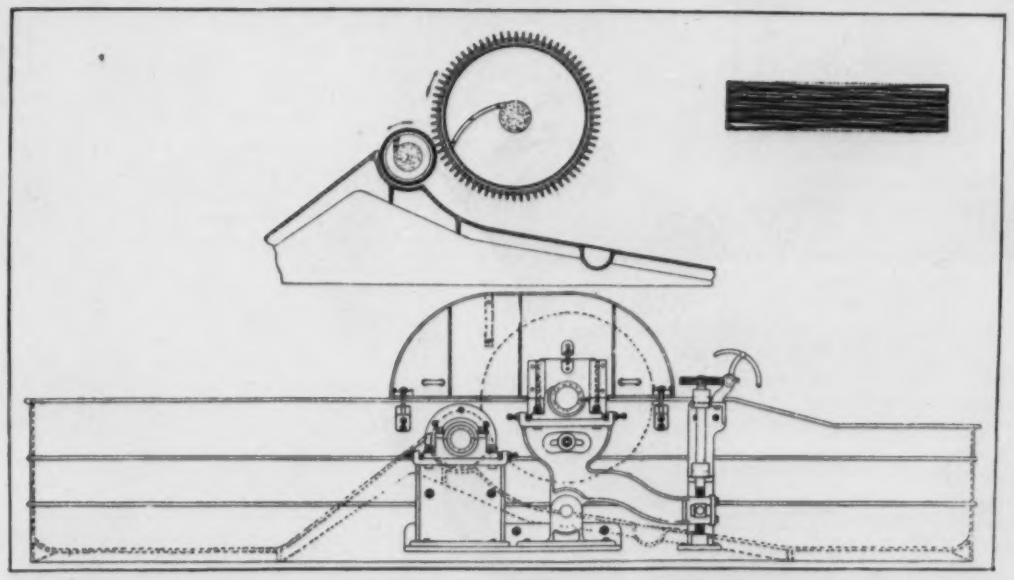
CONLEY'S REVOLVING BED-PLATE ENGINE.

SOME OF THE ADVANTAGES GAINED ARE:

At the point of contact of the two rolls the metal never comes together, and there is always a thin sheet of the stuff passing between the rolls, never allowing the rolls to touch. This is the cardinal principle of the engine; that when the rolls are set up together and working, 186 bars in the big roll pass over 202 bars in the small roll every second of time, or over 12,000 cuts per minute.

A Stronger and Better Sheet of Paper can be made from Stuff made in this Engine. A Saving of one-third in power. A Saving of one-third in time of beating. A perfect mixer, which does not heat the stock.

All kinds of stock, from rags to broken, can be used without clogging. It has no closed passages or sharp corners, where the stock can lodge. The only engine that will beat out sulphite pulp without cutting the fibre.



BRISTOL, N. H., May 10, 1897.

MR. EDWARD CONLEY:

Dear Sir—In answer to your inquiry regarding the working of your new Patent Revolving Bed-Plate Engine, I have to say that we have run the Engine now over thirteen months, beating stock for Manilla and News Paper. I find that it draws the stock out splendidly, which gives it a long and strong fibre; in fact it is impossible to cut up the stock or spoil it with a Revolving Bed-Plate. At the same time I can beat off five tons of stuff in twenty-four hours with half the power we formerly used on the old style Bed Plate Engines, and make better paper from the same kind of stock. Besides, it is a thorough mixer, and the stock does not lodge in the process of beating.

The engine is running equally as well to-day as on the first day we started it. We have not had to spend a dollar for repairs, and from the appearance of the bars in both rolls I should judge that they are good for ten years to come. It is a splendid Engine for any kind of stock, and I cheerfully recommend it to anyone wishing to do good work in a short time, with a small amount of power. Sincerely yours, C. A. LUCUS, Superintendent.

INFRINGEMENT NOTICE.

My attention having been called to the fact that certain parties are infringing certain Letters Patent granted to me July 23, 1889, No. 407,641, covering a beating engine for paper pulp, with a revolving bed-plate, this is to notify all such persons, whether manufacturers or users of said engines, that any infringement of said patent will be prosecuted to the full extent of the law. EDWARD CONLEY, Patentee.

For further information address: EDWARD CONLEY,

Or OSGOOD & BARKER, Bellows Falls, Vt., U. S. A. TELEPHONE, 1309 CORTLANDT. Morse Building, 140 Nassau St., New York.

Bergen kept there, while his old black cook, "Aunt Belle," took a motherly interest in my lunches.

THE OLD "RIGGING HOUSE."

The office and warehouse of the firm were yet in the "Rigging House," located at what is now No. 120 William street, New York. This building had quite a history, having been the birthplace of Methodism in America, the first meeting of that denomination being held on the second floor of the building in 1767. There it was that Philip Embury, a carpenter who had emigrated from Ireland, conducted religious meetings, while during the Revolution, Capt. Thomas Webb, an officer of the British army, preached there, arrayed in full scarlet uniform, and with his sword lying on the table before him. An old picture of the building shows the sign of the firm who took up their quarters there, while the Methodists had secured a more convenient and larger home on John street. The "old Rigging House" was torn down in 1850, and the firm removed next door, to No. 122 William street, a building which is standing yet and is now the oldest building in New York City.

I think about 1853 J. & L. DeJonge opened a store in New York, and soon began manufacturing in Staten Island, increasing their lines with every year. The panic of 1857 for a time checked all trade, but the recovery was quick, and shortly after this W. A. Walther and H. L. Legien, who had been clerks with George J. Kraft, started to manufacture. I remember them in their Ann street factory, always industrious and enthusiastic in their work.

In 1862 the trade developed rapidly. The New York houses all enlarged their factories; new companies were formed at the East and the consumption of paper increased so fast that paper mills found the supply of this trade taking their entire production. From this time the growth was steady, the market was enlarged, novelties were produced, machinery invented or adopted, until from 1880 till 1893 our manufacturers had entire control of the American market, and were producing papers adapted to the trade in this country better in quality and cheaper in price than could be found elsewhere. In 1893 some twenty houses were engaged in manufacturing surface-coated papers, with an estimated capital of five million dollars, and employing about three thousand workmen and workwomen.

METHODS OF MANUFACTURE.

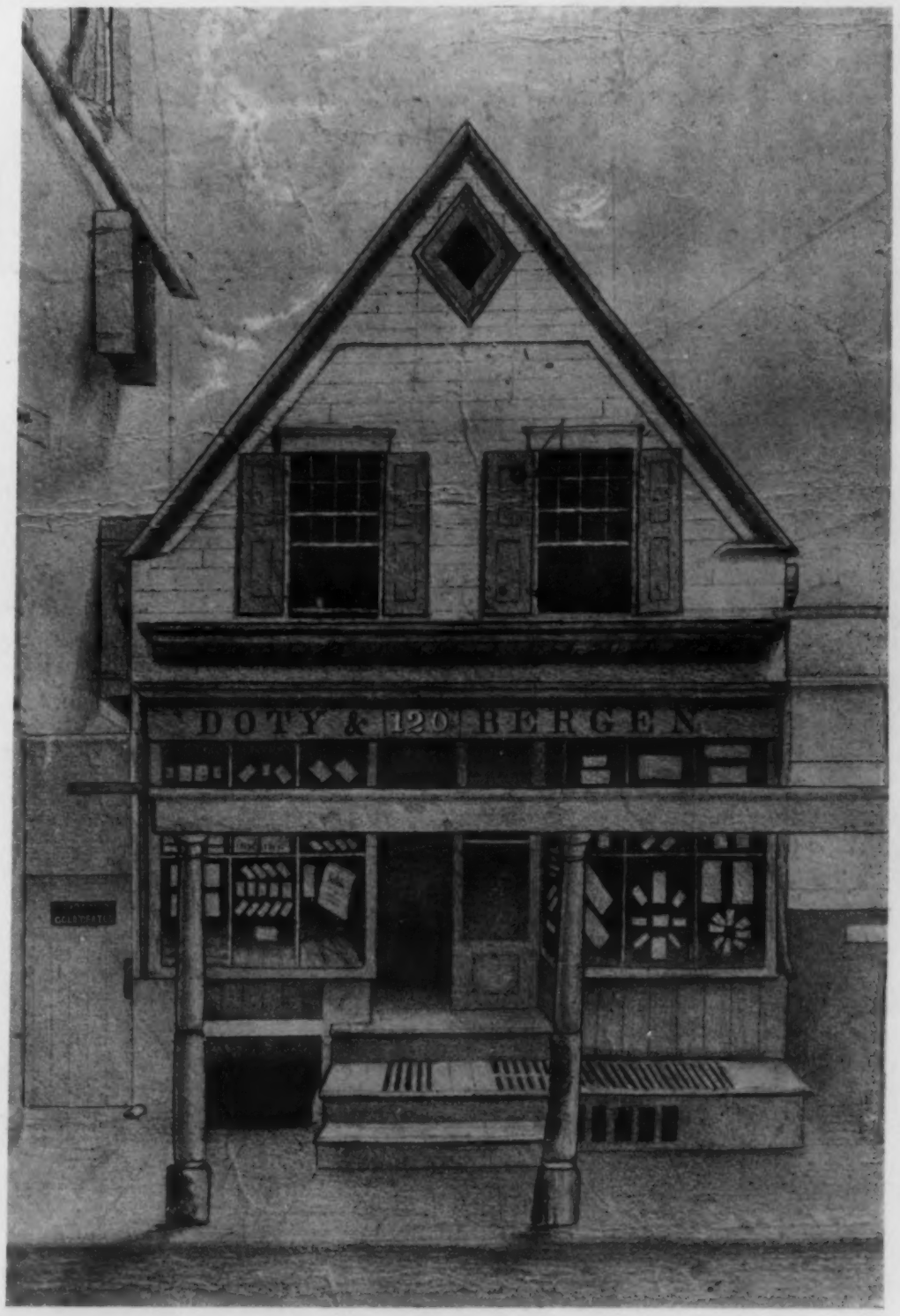
At first, as I have said, the manufacture and the product were crude; the papers being coated in the sheet, the edges curled up and cracked as the paper dried out. Nor were the papers uniform in color, though the hands who did the coating by long experience became quite expert in the work. Girls working at piece work received $8 to $10 per week. Most of the paper was printed, some of it in fancy patterns for paper boxes and for small decoration, and some paper was embossed into morocco and similar papers. About 1858 to 1860 machinery began to be adapted to the business. In this, I think, the Messrs. De Jonge were pioneers. First came a machine for coating the paper in the roll, and with a hanging machine similar to that in use by the wall-paper trade, which took the paper from the coating machine and carried it in festoons some 200 to 400 feet, over steam pipes which dried the paper slowly. Then to finish the paper and give it a polished surface the friction calender was adapted from the cotton factories. With this equipment the product was multiplied tenfold or more, and the cost brought so low that it was available for a multitude of purposes where it had not hitherto been used. It gave a great impetus, too, to the paper-box business, which from this time developed into a large and constantly increasing trade. For several years the coating of paper for paper collars occupied several large houses; one manufacturer ran largely on lamp shades; and every manufacturer was fully occupied. The experience gained in the next twenty years enabled the American manufacturers to improve and cheapen their papers and to practically control the American market. Some papers, notably white glazed and some of the finer shades, such as steel-blue, bronze and fine red shades, were yet produced by the old and slower process of flinting, and at the close of the war were subject to close competition from Germany. It was still, however, the custom abroad to produce the papers by hand, a whole family frequently participating in the work and a factor or merchant gathering it for export. Effects in colors were produced by coating two, three or four times, which the low price of their labor enabled them to do. The Americans met it by coating on machine one heavy coat, and the friction calender enabled them to give it sufficient finish, so that very soon the calendered steel-blue, bronze and even white replaced the imported goods. Flinted goods were yet produced, but, the process being much slower, the papers were necessarily higher in price and of more limited sale. It was not until 1884–5 that the flinting machine was so improved as to flint the paper in the web, and automatically, an improvement of great value, which reduced the cost of flinted papers and brought them into larger use

THE DEVELOPMENT OF THE BUSINESS.

While these improvements were being made in the papers for paper-box makers and similar uses, a great trade had been developed in making coated white plated paper for lithographic printing. In this, as in other lines, experience had overcome all the difficulties of the earlier attempts, and a very large and profitable business had been built up, occupying the entire plant of several of our largest manufacturers. This led, too, to another development, the advent of "coated book" paper, as it is called; being the coating of a white ground of generally a thinner nature, and on a stock generally inferior to that used for lithographic white plated. This, however, could be offered at so low a rate and met with such general approval that the product increased, and finally many paper mills added a coating department to their equipment. At first coated upon one side of the sheet only, improved machinery was devised for coating on both sides at one operation, and the pioneers in this work gained an enviable reputation and made a very successful business.

THE COLORS USED.

An entire revolution has taken place in the colors used for this business. Many of those used in the early days have gone out of existence or are obsolete and out of the market. Zinc white and white lead were once the foundation of all fine white-coated papers, and it was a great relief to the trade when they were supplanted by the preparation of barytes known as blanc fixe. No substitute has been found for blanc fixe, but its price has been greatly reduced. Paris green was another color in general use in large quantity, and not yet obsolete. Many semi-substitutes have been tried, and are adopted to some extent, but where Paris green is used it is in much smaller quantity and in less objectionable form. Many fine and expensive colors, such as Bremen blue, have given way to cheaper substitutes, and the whole range of crimson, scarlet and red colors have been driven



THE OLD "RIGGING HOUSE."

out by the invention of aniline, and the subsequent scarlet and other dyes resulting from that invention. There has been no other so far-reaching revolution in the coloring materials used in this business as that resulting from the discovery of the valuable properties of coal tar. It has reached to almost every shade of color, has gradually improved in stability, firmness and imperviability, and has materially modified the cost of many shades. Ultramarine in the early days was scarce and expensive. It was generally understood then that it could not be made in this country, partly on account of the climate and partly because the proper material for its production could only be found abroad. About 1880, however, Americans commenced the manufacture here, and soon produced a satisfactory article at greatly reduced prices.

I need not comment in this article on the revolution in the quality and price of the paper which forms the groundwork of our goods. The introduction of ground wood, of sulphite, etc., has enabled us at times to reduce our prices, at others to improve our product. The stock we get to-day from our American paper mills is in appearance superior to anything produced elsewhere at the same price. It lacks, however, one quality of the stock used by manufacturers abroad with whom we come into direct competition. The foreign stock has the faculty of holding the moisture of the coating on the surface of the paper until it sets or dries before penetrating that surface. The American stock, on the contrary, allows the moisture to penetrate the surface of the sheet, though not to reach the lower surface. But this penetration of the upper surface costs us more in color, makes it more difficult to obtain a high gloss, and opens the way by the curling of the edges and cockling of the sheet to damage and loss. American paper mills must overcome and remedy this difficulty, or our stock, if not our finished papers, will come from abroad.

There has always been a pleasant, friendly feeling among the houses engaged in this business, and the exchange of courtesies has been frequent. For many years there was no generally accepted term that denoted the trade. About 1885, however, at a gathering of the trade it was voted that our goods should be known hereafter as "surface-coated papers," and we as manufacturers of and dealers in the same. The name was adopted by all the trade, and is now so known throughout the country and the world.

VARIOUS STYLES OF PAPERS.

Surface-coated papers are made and carried in stock in very great variety of colors, size and quality. For the machinery now generally in use by paper-box makers it is made in rolls, and for this purpose American papers are more free from imperfections than the imported. They are made with different kinds of finish, known as flinted when polished with flint stones, friction when polished by the friction of calender rollers, plated when smoothed by the pressure of plates or rollers, enameled when brushed and plated. The waterproof, leatherette, calf finish and varnished are still other styles of finish.

Prices and qualities of surface-coated papers vary with

A. The weight and quality of the paper used, finer qualities invariably giving purer and brighter colors and tints.

B. The material used to make each special color or tint.

C. The labor required to produce the finish or lustre desired.

D. Any further process, such as printing, embossing, etc.

NEEDS OF A MODERN PLANT.

A well-equipped modern paper-coating manufactory for general business requires a plant sufficiently large for a certain number of coating machines, enough to coat not alone the quantity desired, but also to permit the variety of shades necessary, some of which interfere seriously with others. Sufficient drying space must also be allowed, that the colors may not dry too fast nor too slow. A well-situated and well-equipped color room, with plenty of "mixers" and color mills, and an ample supply of pure water and good drainage are a necessity. The color room should be so situated that the mixed colors may be easily delivered to the coating machines. The machine room must be convenient to receive the coated paper, and supplied with all the different machinery for the finishing and subsequent processes. Another very important department is the assorting room, where the imperfections are carefully removed, though in these later years of delivering paper in the web American manufacturers have aimed to make the papers without imperfections.

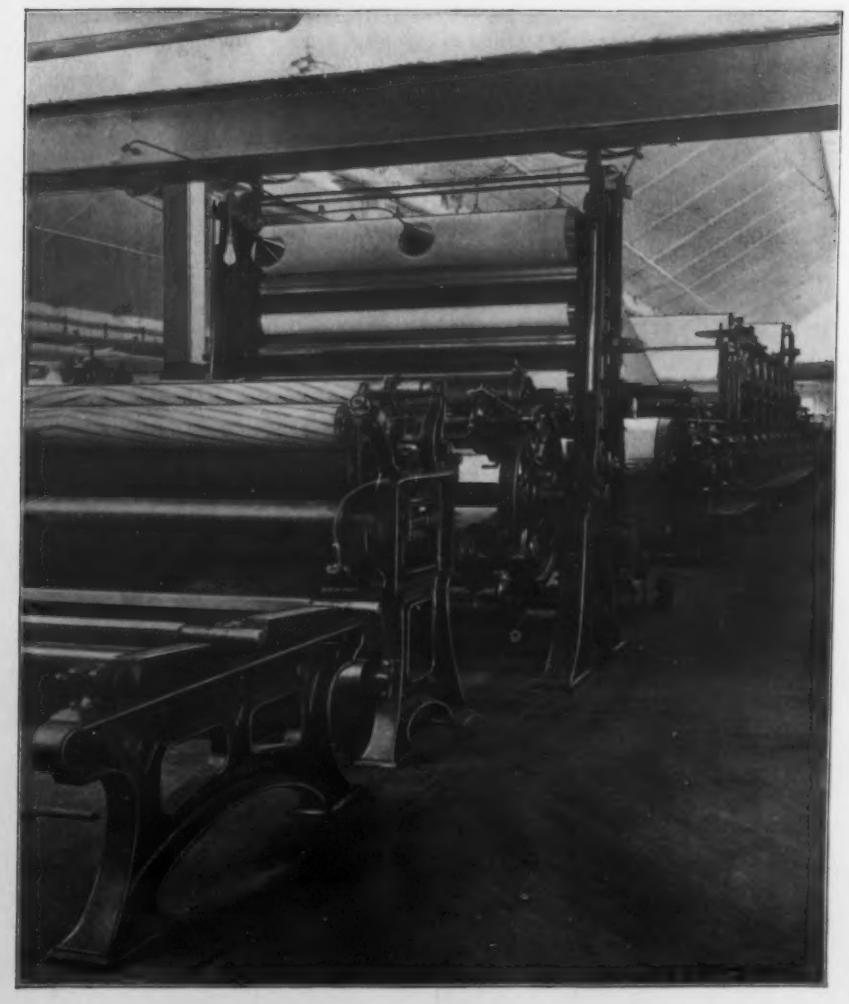
There are several qualities of papers that as yet have not been manufactured in this country to any extent. Among the most important of these is fine gold paper, and the various grades of marble paper used mainly by bookbinders. Being hand-made papers, the rates of labor abroad render it impossible to manufacture here; but with these exceptions there is scarcely a grade or sample of paper made abroad that cannot be made by a well-equipped surface-coated paper manufactory in America.

Contraction and Hard Money.

A paper maker who worked in the two-vat mill built by the Messrs. Warnock about 17 miles south of Lexington, Ky., used to relate the following story:

There was then no uniformity in the currency in that part of the country. The principal medium of exchange was money issued by the commonwealth of Kentucky, which, however, was far below par. Many private parties were in the habit of issuing their own script, which took the place of money and was good in the immediate neighborhood. One day in the summer of 1823 a merchant who wished to issue his own script upon the free-banking principle applied to this mill for some strong, serviceable paper, stating that it was to be used for money and that he wanted it to last a long time. The order was taken. The pulp was made of clear-milled Kentucky hemp. When put into the moulds it had a fine gloss and looked like jelly, but worked so slow that the water would scarcely leave it. After it was made into paper it was found to be very hard and had shrunk so that it cockled, having the appearance of dried rawhide, and was in such a condition that it could not be used. "I suspect," says the historian, "that that was a primitive step toward contraction and hard money. It was necessary to work it all over again with a mixture of soft rags to give it elasticity, a quality which all currency, whether hard or soft, should possess."

The only vat mill in the United States to-day is that operated by the L. L. Brown Paper Company, in connection with its machine plant at Adams, Mass. A part of the plant has been shown at many exhibitions, and is a point of interest about which crowds always collect. The people never seem to tire asking a thousand and one questions of those in charge.

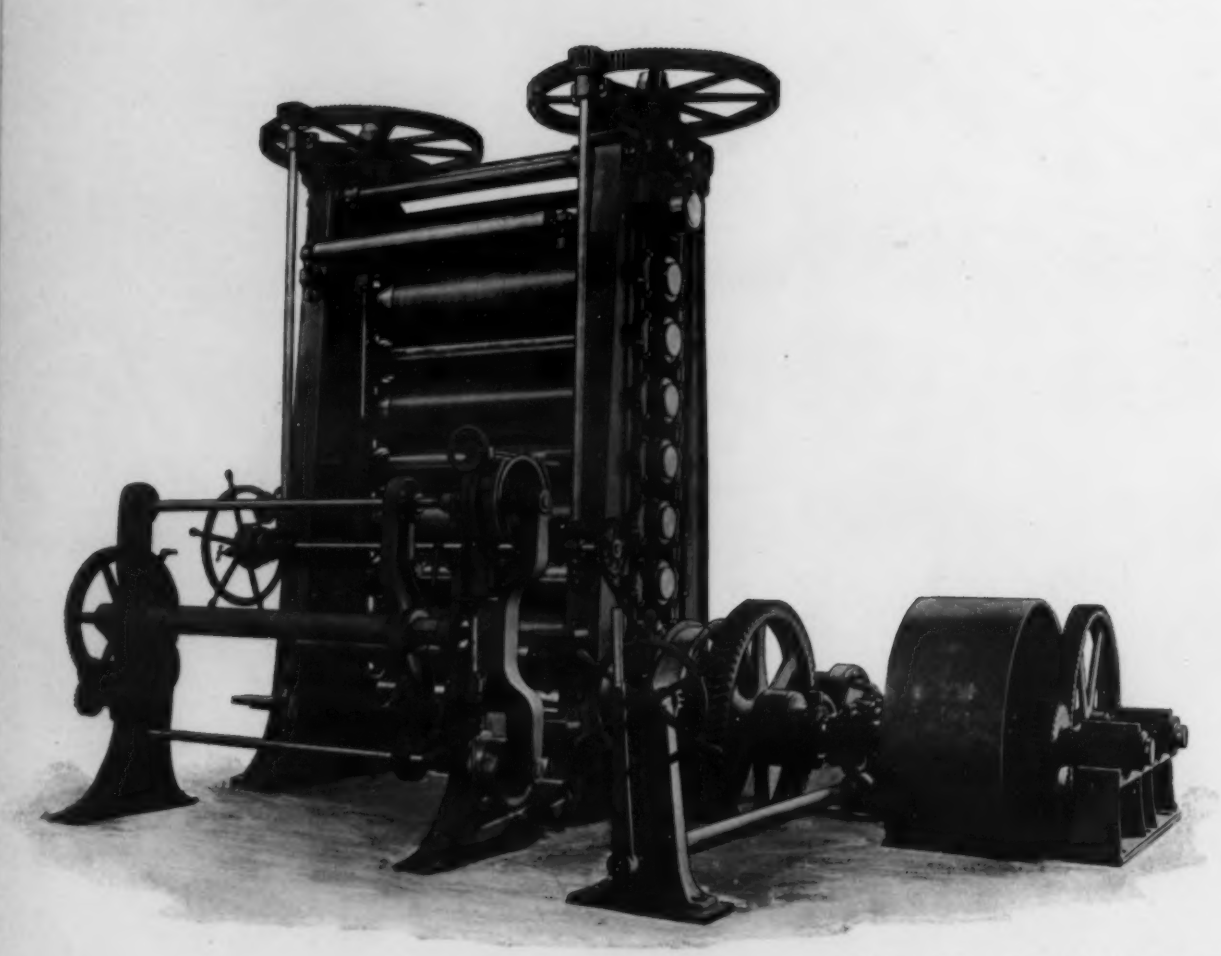


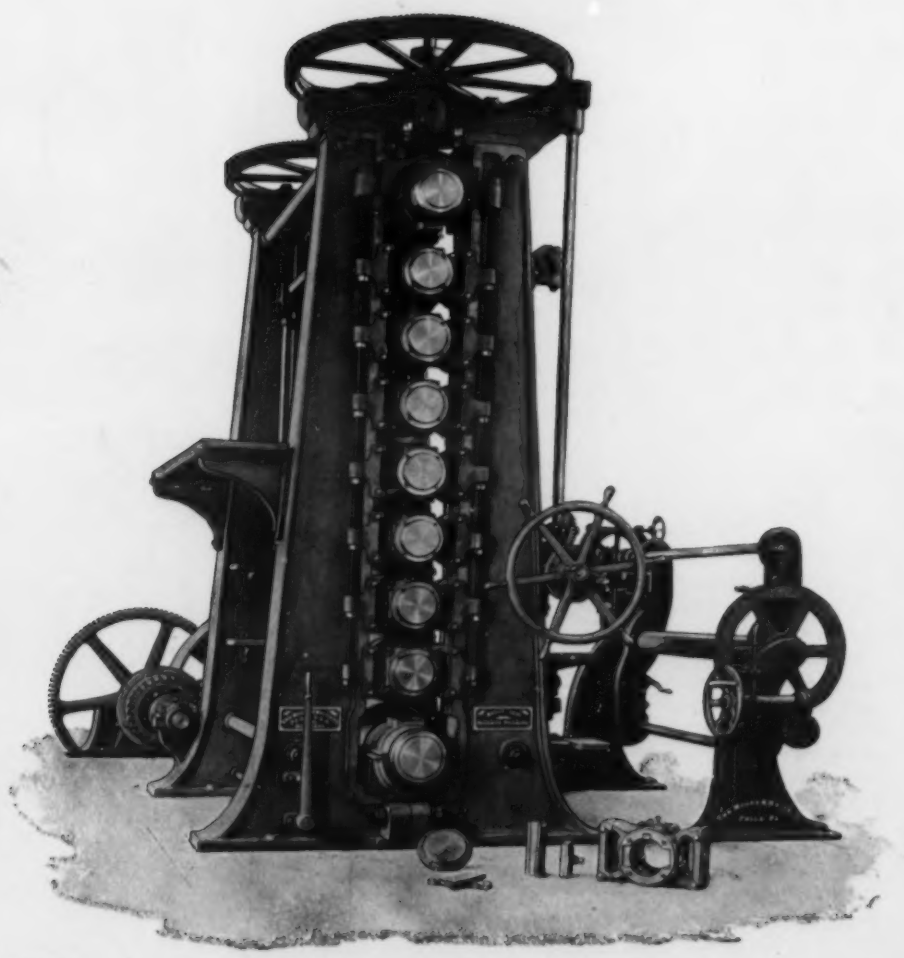
THE MOORE & WHITE CO.,

PHILADELPHIA, PA., U. S. A.,

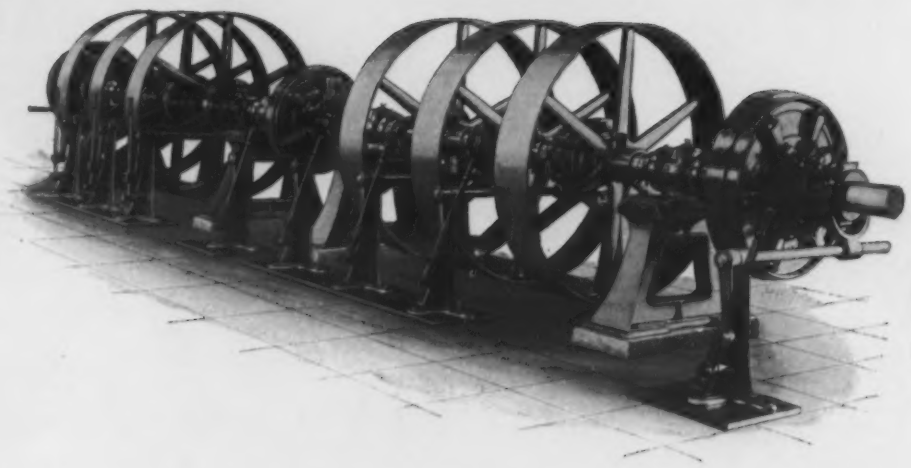
BUILDERS OF

Paper Machinery





STACK OF 52-INCH SUPER CALENDERS.



Manufacturers of the

"MOORE & WHITE"

Friction Clutch and Cut-Off Couplings.

JEFFERSON COUNTY MILLS.

A HISTORY OF THEIR DEVELOPMENT FROM 1804 TO THE PRESENT.

A Love Story—A Tailor Turns Paper Maker—The First Mill—Early Methods and Equipment—The Manufacturing Trade Concentrated at Watertown, N. Y.—Some Interesting Statistics.

By GEORGE W. KNOWLTON.

THE beginnings of the paper-making industry in Jefferson County are to be credited to Gurdon Caswell, who was born in Norwich, Conn., in 1783. He was a tailor by trade, and in 1804 came to Westmoreland, Oneida County. At Walesville, Oneida County, about nine miles west from Utica, was, and is yet, a paper mill on Oriskany Creek, which in 1804 was owned by Nathaniel Loomis and his son Erastus. Now Nathaniel had not only a son, but also a daughter, Mary, and the young tailor from Connecticut forthwith fell in love with and married her, and joined his fortunes with his father in-law in the paper mill. He must have found paper making more attractive than the tailor's bench, for in 1808, when the Black River country was the Mecca for so many pilgrims from the Mohawk region, Gurdon Caswell came to Watertown and built the first paper mill. The building was a two-story frame structure, 35 x 50 feet, but a considerable part of the second floor was used for a wool-carding machine. The machinery in this mill consisted of a small rag engine, or Hollander, carrying about 150 pounds of rags; two or three potash kettles set in a brick arch, for boiling the rags and preparing the sizing; one vat for making the paper, sheet by sheet; and a rude standing press to squeeze the water out of the pack, as the pile of alternate felts and wet sheets was called. After pressing the sheets were taken from the pack and hung on poles to dry, and if intended for writing purposes were afterwards dipped in sizing, a few sheets at a time, and dried again. There was no steam used in any part of this process; no chlorine for bleaching; no calendering, the substitute for the latter being pressing between boards.

Such a mill, costing from $3,000 to $5,000, would employ four or five men and as many women, and was capable of turning out 150 pounds of paper per day: but there was little of the pushing that to-day crowds every machine to its utmost capacity. Rags were scarce, the demand for paper limited, and the men had an uncomfortable habit of going on prolonged drunken sprees, when all work must come to a stop. Caswell called the mill "The Pioneer Mill."

It continued to make paper till 1833, when Knowlton & Rice, who had bought the mill in 1824, sold the lot and moved the building to their new premises, a few rods further up the stream. Caswell's family remained in Oneida County till 1814, when he bought a farm and removed them to Watertown. In 1819 he built his second mill. This mill was soon sold to his brother, Henry Caswell, and brother-in-law, Erastus Loomis, and in 1824 was bought by Knowlton & Rice, who continued to use it till February 7, 1833, when it was burned.

In 1823 Caswell, in company with Ralph Clapp and William K. Asherd, built his third mill on Sewall's Island, occupying part of the premises now owned by the Bagley & Sewall Company. This mill was torn down about 1830. Gurdon Caswell removed to Clayton, Jefferson County, in 1832, and died there in 1862, aged seventy-eight years.

Making Paper in the Early Days.

In 1824 Geo. W. Knowlton and Clark Rice, then living at Brattleboro, Vt., bought of Joseph Fessenden, of Brattleboro, the first two mills built by Caswell, for $7,000. For the next thirty years, till 1854, Knowlton & Rice were, with unimportant exceptions, the only paper manufacturers in Jefferson County. In 1833 they abandoned both the old mills, and built on the site now occupied by the easterly half of Knowlton Brothers' mill a new mill, with two rag engines and the first machinery for making a continuous sheet of paper (36-inch cylinder). At first the wet web of paper was wound on a reel, cut open with a knife, and dried on poles, as before; but copper dryers, calenders and a cutter were added, and the mill ran successfully until 1848, when it was burned on March 21 in a great fire which swept several manufactories from the south shore of Black River. It was immediately replaced by a brick mill having three rag engines and improved machinery. The capacity of this mill was 600 pounds to 700 pounds per day. This mill continued to run till 1869, when it was practically rebuilt by Knowlton Brothers, and equipped with modern machinery.

In 1854 Knowlton & Rice retired from active business and sold the mill to Brown & Chamberlain, of Dalton, Mass., though Mr. Rice retained an interest in the business. Mr. Knowlton's sons, John C. and George W., Jr., bought the mill in 1861, and under the name of Knowlton Brothers still continue the business, having added adjacent premises and additional buildings as their business increased.

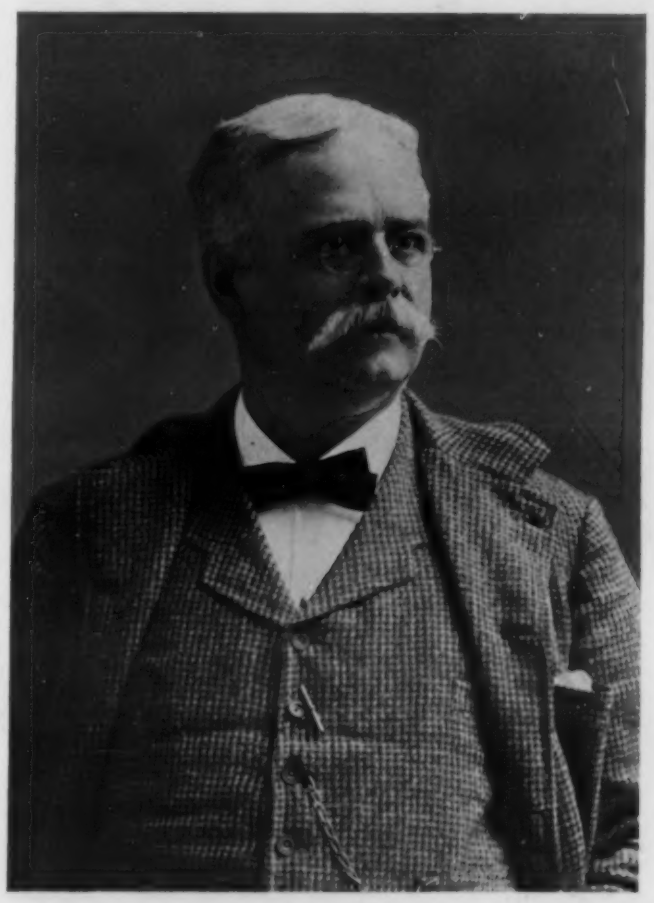
Up to 1854 most paper mills had made a great variety of papers, partly to supply the local demand for different kinds of paper. Wrapping paper, news paper, paper for school books and blank books, ruled foolscap and letter papers were all turned out of the same mill with the same machinery, the main difference being in the quality of the rags used, for all the stock was rags in those days. But after the completion of railroads, and the greatly increased facilities for the exchange of goods with remoter parts of the country, it was found to be more economical for each mill to have its specialty and confine itself to one line of goods. Thus the Brown & Chamberlain mill—subsequently operated by Chamberlain, Farwell & Co. and Knowlton Brothers—was about this time devoted entirely to the making of writing papers.

In 1854 I. Remington & Sons, then operating a mill at Fayetteville, N. Y., leased the long idle Juhelville cotton mill from P. O'Dougherty, and fitted it up for paper making, with four rag engines and an 84-inch Fourdrinier machine. The mill was run entirely on news paper. It had a capacity of three tons per day, and was in those days considered a large mill. The firm was composed of Illustrious Remington and his two sons, Hiram and Alfred D. A. D. Remington removed to Watertown, and to his energy, business ability and mechanical skill much of the development of the paper-making industry in this section is due. In 1863 he became sole proprietor of the mill, and in 1865 organized the Remington Paper Company, now operating one of the most extensive plants in the country. On the expiration of the O'Dougherty lease, in 1867, the mill was removed to Sewall's Island, in and 1869 the first wood-pulp machinery was introduced. From that time there has been an almost constant increase of facilities and capacity, until now the Remington Paper Company operates two large paper mills, three wood-pulp mills and one sulphite-fibre mill, the daily output of paper being 30 tons, all made from spruce logs on its own premises, no rags or other fibre being used.

In 1862 the mill now owned by the Watertown Paper Company was built by A. D. Remington, at the island end of the upper dam crossing the south channel at Sewall's Island. The mill was for many years operated by Hiram Remington and Charles R. Remington, a third son of I. Remington. Since 1881 it has been owned by H. Remington & Son.

The mill now owned by the Taggart Brothers Company, on the lower dam in Watertown, was formerly a distillery and flouring mill, built by William H. Angel. The buildings were purchased by West, Palmer & Taggart in 1866, and paper machinery put in the western part of the buildings. Subsequently all the buildings were utilized for paper making, part of the product being paper made from manilla rope, which is made into flour sacks on the premises. B. B. Taggart and W. W. Taggart have been identified with this enterprise from the first, and are now largely interested in the Taggarts Paper Company, owning a fine new mill at Felt's Mills.

Charles R. Remington sold his interest in the Watertown Paper Company's mill in 1881, and in company with his son, Charles H., built a mill 3 miles below Watertown, at Wood's



George W. Knowlton.

Falls. This mill has a magnificent power, 3,000 to 4,000 horsepower, and is equaled only by the Ontario Paper Company's power just below it. C. R. Remington & Son use most of this power in their extensive wood-pulp mills.

The Great Bend Paper Company's mill, built by George Clark in 1868, was at first intended for a strawboard mill, but machinery was soon put in for making hanging paper. After Mr. Clark's death (1887) the mill was purchased by F. A. Fletcher, of Watertown (1888), who associated with himself E. H. Thompson, also of Watertown, and made extensive additions to it, continuing to operate it under the name of Great Bend Paper Company.

The manufacture of strawboards was begun in Brownville in 1880 by Haight & Lane Brothers. This mill later developed into the paper mills of the Black River Paper Company, now known as the Globe Paper Company.

The development of the paper industry since 1887 has been so rapid that the details must be looked for under the accounts of the several towns. The table appended gives a full statement of all mills now in operation in the county, with a full daily capacity (not average product) of each, and dates of commencement of the business, and also date of organization of present company or firm. The thirteen companies operate fourteen mills with nineteen Fourdrinier and two cylinder machines, and have a daily capacity of 160 tons.

	Business First Established	Organization of Present Company.	Full Daily Capacity in Pounds.	Kind of Paper Made.
Knowlton Brothers, Watertown	1808	1861	10,000	Colored.
(a) Remington Paper Company, Watertown	1854	1865	60,000	News.
Taggart Brothers Company, Watertown	1866	1887	12,000	News and manilla.
Watertown Paper Company, Watertown	1862	1864	26,000	News.
(b) C. R. Remington & Son, Watertown	1882	1882	50,000	News.
(b) Ontario Paper Company, Watertown	1888	1888	50,000	News.
(c) Taggarts Paper Company, Watertown	1889	1889	36,000	News.
Globe Paper Company, Brownville	1880	1889	14,000	Manilla.
Outterson Paper Company, Brownville	1887	1887	8,000	News and colored.
Brownville Box & Paper Company, Brownville	1888	1888	8,000	News.
Frontenac Paper Company, Dexter	1880	1887	20,000	News, etc.
St. Lawrence Paper Company, Dexter	1889	1889	20,000	News.
Great Bend Paper Company, Great Bend	1868	1888	18,000	Hanging.
Total			332,000	

(a) Two mills.
(b) Mill in town of Brownville.
(c) Mill at Felt's Mills.

Ground Wood.

When the Voelter process for grinding wood for paper pulp was introduced into this country it was at once adopted by the Remington Paper Company, which started its first wood-pulp mill in 1869.

Owing to our abundant water and our proximity to forests of suitable timber, there has been in recent years a rapid increase in the production of this pulp, which is now essential for the making of news paper.

The table below gives the names of the mills now in operation. Most of these, it will be seen, belong to the paper makers, and produce pulp for their own consumption. A limited part of the product is shipped to mills out of the county. The date given is either organization of the company or, in case of some of the older mills, the date when they began to make wood pulp.

			Pounds.
(a) Remington Paper Company	Watertown	1869	50,000
(b) C. R. Remington & Son	"	1882	24,000
(c) H. Remington & Son Pulp and Paper Company	"	1887	12,000
Taggart Brothers Company	"	1872	6,000
Knowlton Brothers	"	1884	3,000
(b) Ontario Paper Company	"	1888	50,000
(d) Taggarts Paper Company	"	1889	24,000
Outterson Paper Company	Brownville	1887	6,000
Globe Paper Company	"	1888	4,000
Brownville Box and Paper Company	"	1888	5,000
St. Lawrence Paper Company	Dexter	1888	10,000
Leonard, Gilmore & Co.	"	1888	5,000
Everitt, Jones & Hunter	"	1888	5,000
H. Spicer & Sons	Carthage	1888	5,000
M. R. Diefendorf	"	1888	5,000
Great Bend Paper Company	Great Bend	1888	6,000
Black River Wood Pulp Company	Black River	1888	6,000
Empire Wood Pulp Company	"	1888	9,000
Jefferson Paper Company	"	1889	24,000
Total			234,000

(a) Three mills—the largest one in town of Pamelia, below county house.
(b) Mills in town of Brownville.
(c) Mills at Black River.
(d) Mills at Felt's Mills.

Sulphite Fibre.

Two large mills for the production of this new and important addition to our resources for paper stock have recently been completed. This fibre, made from wood, is much more costly than the ground-wood pulp, but in strength and color can be made equal to the best rag stock, and is used by all the mills to take the place of rags:

Dexter Sulphite Pulp and Paper Company, Dexter, 1888; daily capacity, 20 tons. Remington Paper Company, Watertown, 1889; daily capacity, 15 tons.

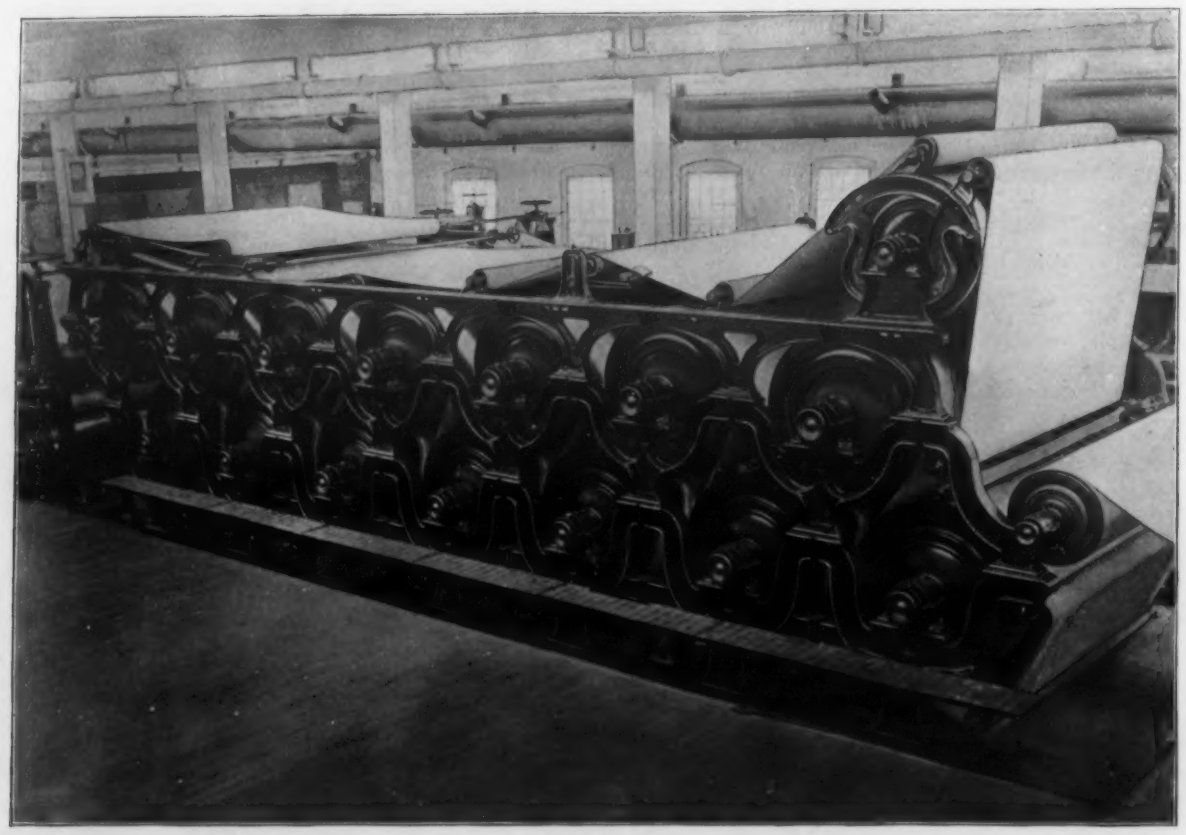
In writing the above I am reminded of the great changes that have taken place in the paper-making industry since I became familiar with it. In the days of long ago the speed of a machine was from 30 to 60 feet, and I well remember that on two machines on which I had some practical experience the extreme speed, with the water-wheel gate wide open, was 36 feet a minute. Compare that with a machine 160 inches wide running 500 feet a minute! I think it was A. D. Remington who first speeded a machine to run up to and over 100 feet, and in this connection I can tell of a little incident that will show how fast running was considered thirty years ago. Being a young man, and having to travel about the country to sell the little product of 750 pounds which our mill turned out, I was sitting in the office of Noonan & McNab, of Milwaukee, talking with Mr. Noonan—"Old John Noonan," he was familiarly called—when he asked me if I knew a man by the name of Remington in Watertown. I said I did. "Do you know his mill?" "Yes." "Well," said he, "I want to ask some questions. I have heard that a man in Watertown by the name of Remington runs a paper machine over a hundred feet a minute. Do you know anything about it?" I said: "Yes." "Have you ever seen it run a hundred feet a minute?"

I again said yes. Then he said "You know it of your own knowledge?" I said I did. "Well," said Mr. Noonan, "it was reported to me in some way, so I believed it and told it to my superintendent, and he looked at me as though he thought I was demented, and when I told him that what I had told him was really so he laughed until he almost rolled off his chair [I use Mr. Noonan's exact words], and seemed to think it very funny that a man of my age and experience should have been taken in with such a foolish story."

What changes will the next thirty years bring about? It does seem as though we had about reached the limit. But the experiences of the past continually teach us that future years will probably bring about as great changes as those that have gone by. What could have convinced the old-time paper maker of forty years ago that the paper mills of to-day would be without that important adjunct, a rag room? He probably would have been skeptical about that, as he would have been about the price had he been told that news paper was to sell at less than 2 cents per pound and writing papers at from 8 to 14 cents.

Not a small part of the above article was written a few years ago for a history of Jefferson County. I have omitted some of the original when it seemed too entirely local, and have added in other places to adapt it to the more general reading of a trade paper, but should some discrepancies be noticed the reader will please bear in mind that many changes take place now in even three or four years, that time having elapsed since the history of Jefferson County was written.

THE MOORE & WHITE CO.,



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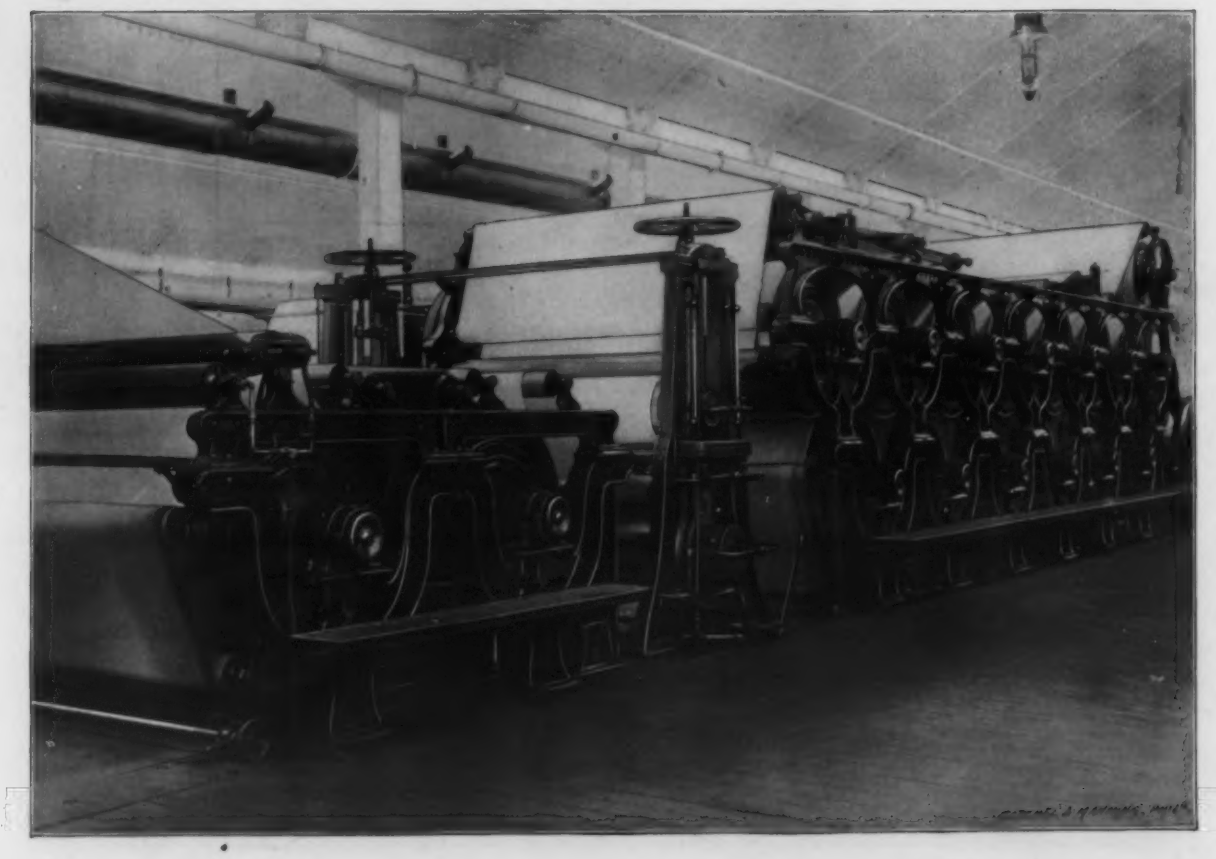
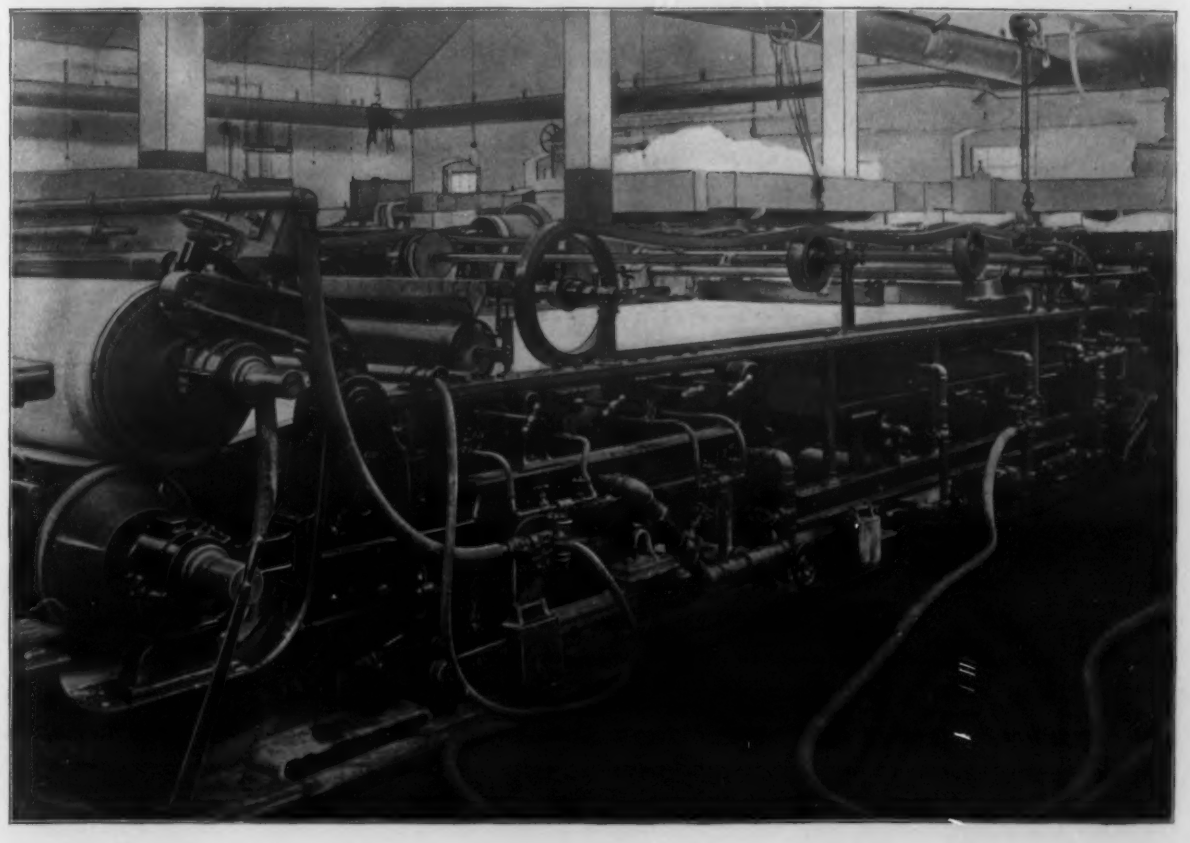


PAPER MACHINERY.

THE MOORE & WHITE CO.,



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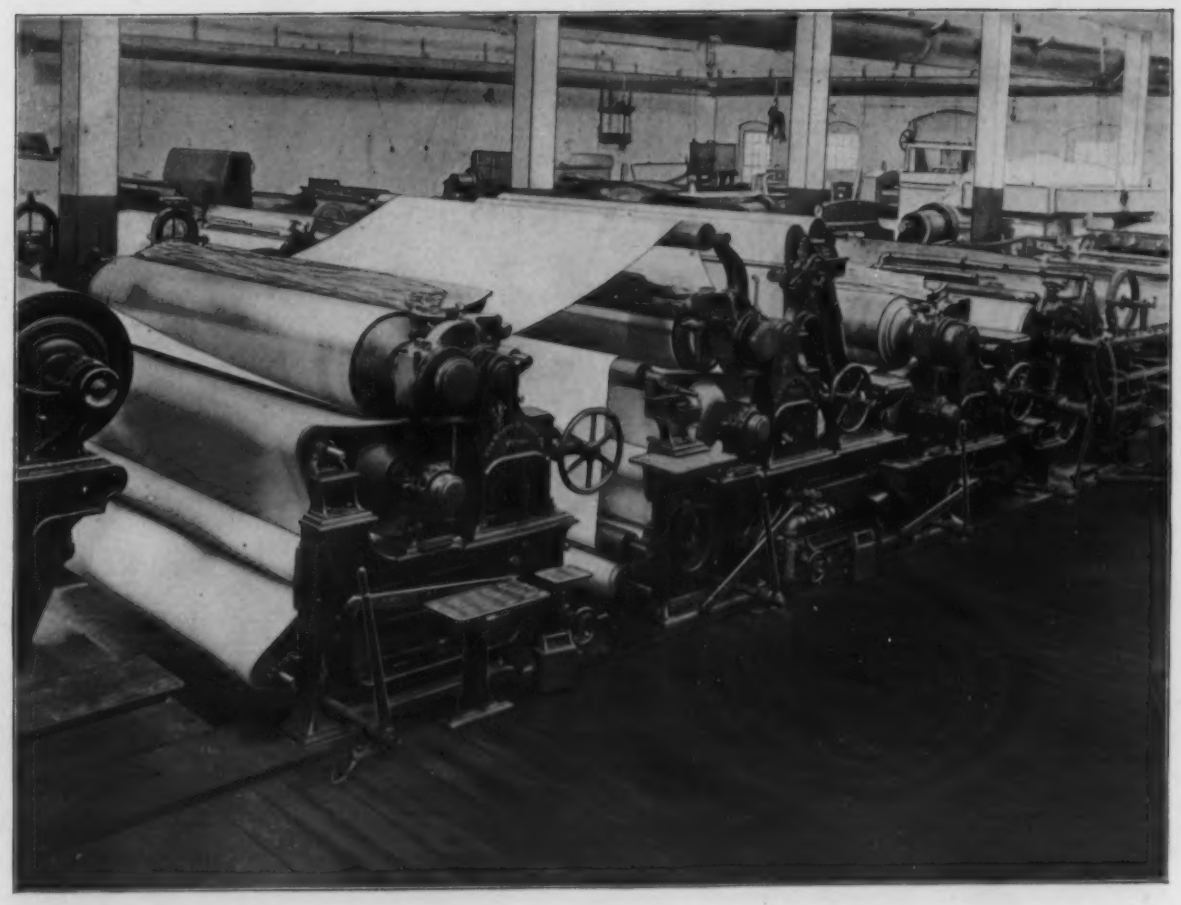

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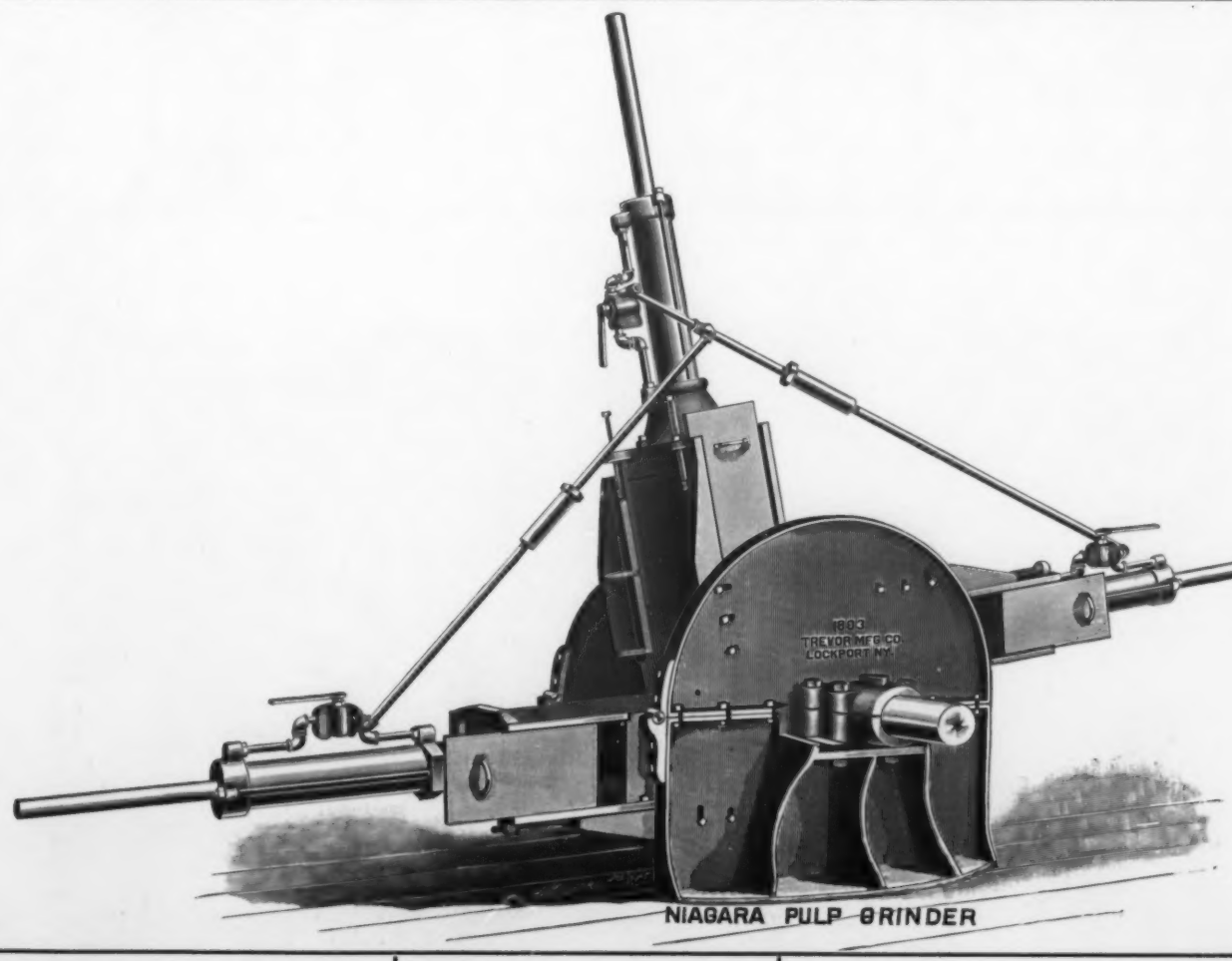
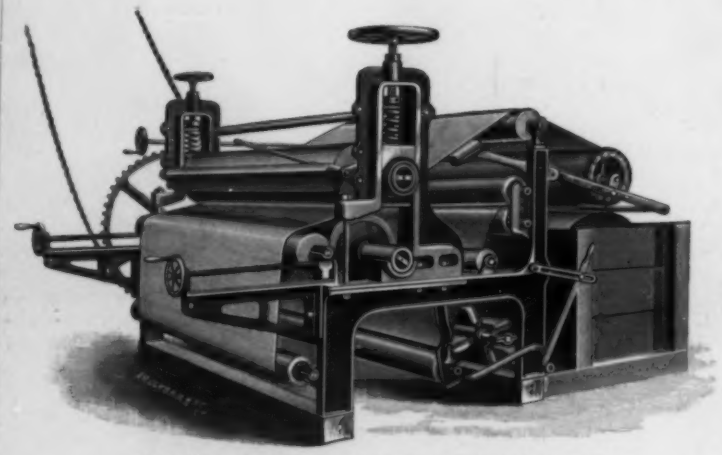


NIAGARA PULP GRINDER



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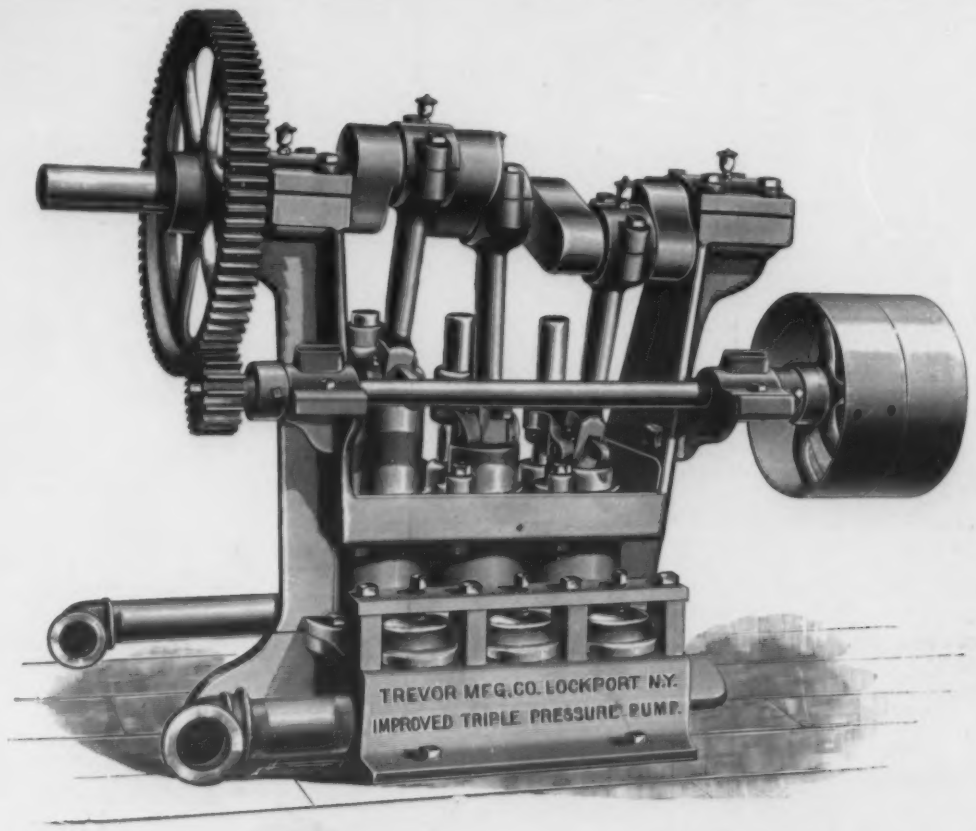
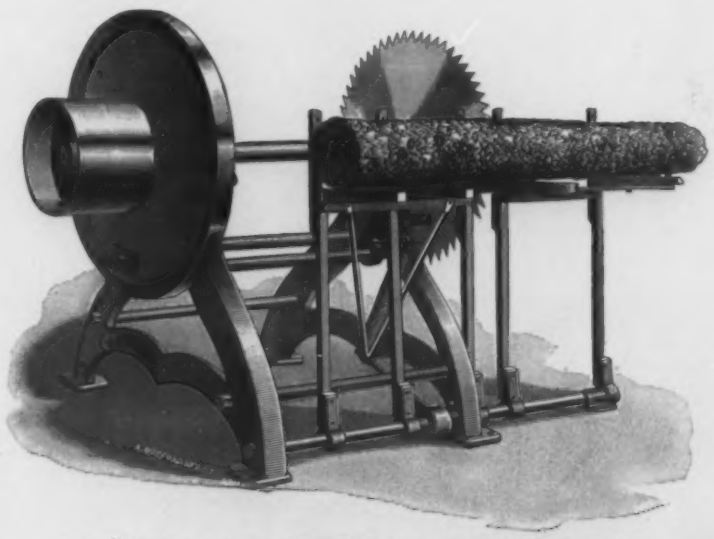




THE "TREVOR" IMPROVED CROSS SAWING MACHINE.

THE NATIONAL ORGANIZATION

HISTORY OF THE AMERICAN PAPER AND PULP ASSOCIATION.

The Origin of the Body—The Fundamental Idea of its Creators—Only Manufacturers Eligible to Membership—Changes in the Constitution—Present Conditions—The Work the Association Has Accomplished.

By CHESTER W. LYMAN.

THE PAPER TRADE JOURNAL, which this year celebrates its twenty-fifth birthday, and the organization known as the American Paper and Pulp Association began life, so to speak, only a few years apart. They have grown up together working in a common cause, and each naturally feels an interest in the other's career; so that now, with friendly feeling, the national association of paper makers presents its congratulations to the leading organ of the industry upon the occasion which this issue of the paper commemorates, and it is furthermore glad to take this opportunity to testify that this companionship, if it may be so called, which has existed for twenty years, has been of great value to itself; for, reviewing its own past, the association is confronted with the evidence of many services rendered it by this journal, especially through the individual efforts of its able and untiring founder, the late Howard Lockwood. He had for years advocated an association of paper interests, and when his wishes were finally realized and an organization effected, he encouraged its efforts, not only through his publication, but by participating in its transactions from time to time. The whole paper industry shares the obligation to him for the statistical information which he for many years supplied. In 1873 he compiled a table giving the daily capacities of the mills—the first comprehensive statistics of the trade ever prepared. In the expectation that an association was about to be formed which would carry on this work he abandoned it for several years, but since 1881 he and his successors have annually compiled such a table for presentation at the annual meetings of the association. Mr. Lockwood from time to time also read papers or spoke at the meetings of the association in relation to the exporting of paper and various other matters. Thus, while the recollection of many of his services may fade as those who were his contemporaries pass away, yet the records of this association, in which his name appears on almost every page, will continue to disclose the obligations not only of this association but of the whole paper industry to him and the paper he founded.

Association's Origin.

The American Paper Makers' Association, as it was originally called, was born of adversity, so to speak, for it grew out of the depression following the rude check which the panic of 1873 put upon the industrial progress stimulated by the war. Since 1873 the paper industry, in common with most others, had been going from bad to worse; prices falling in spite of no material increase in capacity, thus indicating an absolute decrease in the purchasing power of the country. In fact, in 1878 conditions were very much as at present, except that in place of a degree of hopefulness was absolute despair.

There had been at irregular intervals from early days gatherings or conventions of paper manufacturers, but no permanent organization had ever been attempted, so far as the writer is aware. The writing-paper manufacturers, for example, had held an isolated meeting in 1860 at Pittsfield, Mass., when their branch of the business was suffering from overproduction, although the total daily output at that time was estimated to be only about 50 tons!

But in 1878 matters had reached such a point that it was felt that something had to be done, and at an informal meeting of manufacturers at Springfield, Mass., July 20, 1878, a committee was appointed to consider calling a convention of all the paper manufacturers of the country. Such a call was issued on August 1 for a convention to be held at Saratoga on August 28. It was signed by William Whiting, George E. Marshall, C. O. Brown, D. F. Crocker and O. C. Chapin, and stated that "matters affecting the general good of the trade would be discussed, especially the question of demand and supply and the best means of insuring stability to our business, now so seriously demoralized." In accordance with this call a large number of manufacturers assembled at the Grand Union Hotel. The comparatively puny proportions of the industry at that time are displayed in the figures giving the capacity of the mills represented by those in attendance. Thus among the writing-paper manufacturers Z. Crane is credited with 2½ tons, Byron Weston 2½ tons, A. E. Harding 3 tons, William Whiting dwarfing them all with an output of 12 tons; total for writing paper about 100 tons.

In the book and news class, which aggregated 240 tons, the largest concerns represented were Jessup & Moore and the American Wood Paper Company, credited with 20 tons each. Others were Wellington Smith, 17 tons; W. H. Parsons, 8 tons; Warner Miller, 4 tons; J. A. Kimberly, 3½ tons, and A. D. Remington, 6 tons. The largest output represented in the manilla line was 9 tons, George West.

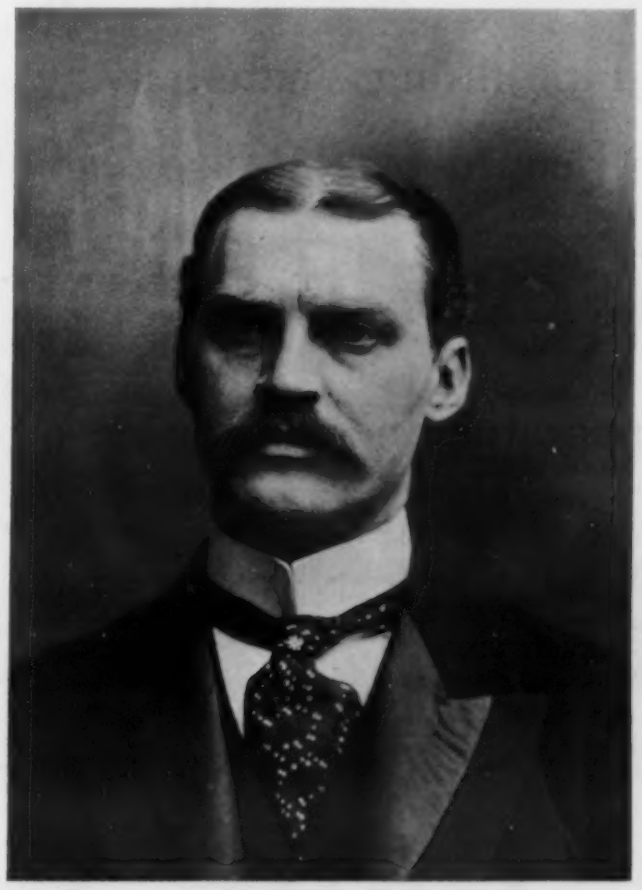
Membership Qualifications.

The convention was called to order by William Whiting, and on motion of William A. Russell, W. G. Plunckett—at that time a Nestor of the paper trade—was elected chairman. A committee of twenty-one was appointed to consider a plan of procedure, but not until there had been a lively debate over its composition, because exception was taken to some of the names proposed on the ground that they were not manufacturers. This led to the consideration of who were entitled to participate in the convention. It was finally decided to limit the number to manufacturers, a manufacturer being defined as an owner or stockholder on a sufficient scale to identify him with the management of a mill. Messrs. Hall, Parsons, Dunton and Rice, feeling that the implication had been made that they were more closely identified with the distribution than with the manufacture of paper, withdrew from the convention, but subsequently, upon invitation, returned, they being regarded as answering the definition of manufacturer as accepted by the convention.

The officers of the convention were: William Whiting, president; C. O. Chapin and W. H. McClung, secretaries; Messrs. A. E. Harding, Whiting, Fairchild, Woodruff and Nixon, vice-presidents. On the following day, August 29, the committee of twenty-one, having prolonged its counsels well into the previous night, recommended a curtailment of one-sixth of the product of all the mills of the country for six months, if 85 per cent. of them would consent thereto. *They also advised the formation of a permanent association.*. In the discussion which followed it is quite interesting to note the freedom with which the arbitrary control of production for the avowed purpose of increasing prices—now a penal offense—was advocated. The president of the convention even went so far as to remind those present that "God helps them that help themselves," which sentiment was greeted with applause.

Plan of Organization.

A committee to draft a constitution, consisting of Messrs. Harding, Whiting, McClung, George West and W. A. Russell, was appointed, and the convention having adopted the constitution submitted to it by them, having elected officers of the association and appointed a committee to carry out the plan of curtailment already decided upon, dissolved without having



CHESTER W. LYMAN.

formally turned over the meeting to the newly formed association, so that strictly speaking it might be said that there was no meeting of the association at this time. Therefore the meeting of the following year was the first. As there was only one thought in the minds of those who attended the convention, which was that they might gain control over the market, so the fruit of their meeting was an organization designed expressly to accomplish that end. This is made clear by a perusal of the constitution. It was recognized that the key to the situation lay in limiting the production, and so membership in the association was jealously restricted to producers. It was the American Paper Makers' Association, and apparently assuming that all manufacturers would be in sympathy and act in accord with a body organized for the general good of the industry there was no enrollment of members, every manufacturer being welcome to attend and take part in the deliberations of the association. But it was expected that each person would appear in a representative capacity for his mill and each mill was entitled to but one vote. The form of organization was a central body with branches on geographical lines. The general officers constituted the Central Executive Council, and among their duties was the arbitration of questions referred to them by the different divisions of the association; they also had power of assessment, the only means provided for obtaining a revenue. Each division, of which there were five, had an executive committee, which was to arbitrate questions arising between members of its own division. The association had headquarters at Springfield, Mass., and the five divisions at Boston, New York, Philadelphia, Cincinnati and Chicago.

Revision of 1883.

Viewed in the light of subsequent events it seems probable that had the organization been divided at the start into groups according to the kind of paper made more success might have attended its early efforts. At any rate this change was made in a general revision which the constitution underwent in 1883, at the instigation of J. W. French, who had at that time been president for one term, he no doubt having felt handicapped by the form of organization. From this action it is evident that the constitution was in a measure held accountable for the failure of the association to achieve up to that time all that had been hoped for. As revised in 1883 the constitution provided for six divisions, viz., writing, book, news, manilla, board and straw wrapping; the headquarters of each division were to be determined by the majority vote of that division. The number of vice-presidents of the association was increased from two to six, one from each division, who was *ex-officio* the president of his division. It was at this meeting in 1883 also that the name was changed to the American Paper Manufacturers' Association, as it was thought the name "paper makers" was misleading, being applied quite as generally to mill employees as to mill owners.

Owing to the wide distribution of the mills it was deemed expedient to enable the Western mills to hold their division meetings in the West and the Eastern mills in the East, and accordingly at the annual meeting in 1884 the number of vice-presidents was doubled to twelve, so that each division might have an Eastern and a Western presiding officer.

In 1887 the number of vice-presidents grew to fourteen, on account of the recognition of chemical fibre making as a growing branch of the industry entitled to be classified by itself.

Revision of 1891.

With only unimportant changes in the constitution the association ran along until 1891, when William T. Barker, who had been elected secretary and treasurer the previous year, carried through another revision. Feeling that the association was not doing what was expected of it, and having studied its history, he came to the conclusion that changed conditions demanded different methods. He argued that the trade conditions were then and had been for some years so much better than those prevailing when the association was started that there was not the same necessity for an organization with centralized power, that it was beyond the scope of such an association to control prices, and consequently that the proper aims of the association should be newly defined, and that such changes should be made in the constitution as comported therewith. The fundamental idea developed by Mr. Barker, and embodied in the revised constitution of 1891, was the cultivation of friendly intercourse among the paper manufacturers, to the end that the association might thus the better promote the welfare of the industry by considering all matters of general interest to it. Members no longer appeared in a representative capacity, but simply as individuals, each member paying an initiation fee and annual dues, thus providing a more reliable income for the association than had hitherto been the case. While the divisions according to the class of manufacture were retained, their wings were clipped by abolishing the executive committees and reducing the number of vice-presidents to one for each division, chosen indiscriminately from East or West. At this time was created the wood-pulp division. Associate members and an annual banquet were also provided for, in recognition of the social aims of the association. Five associate members were elected that year, but, for some reason not stated, at the following meeting in 1892 associate membership was abolished by amendment.

Since this revision of 1891 it must be confessed that the practical utility of the association has not kept pace with the social development, in so much so that the executive council felt constrained, at a meeting in May, 1896, to pass a resolution expressing their sense "that the association should be made a business and not purely a social organization." And at the meeting at Niagara Falls in July of that year a committee was appointed to consider whether any revision of the constitution to bring about this end was desirable, and if so to recommend such changes as they thought best. This committee reported at the meeting in February, 1897, that while they considered changes desirable, yet in the then sensitive condition of the trade any radical course was deemed unadvisable for the present. A number of amendments, however, were adopted, but mostly unessential, the most important being that extending the membership to the mercantile branch of the trade, which necessitated also a change in the name to "The American Paper and Pulp Association."

While these successive revisions of the constitution have, perhaps, impaired the effectiveness of the organization as a working body in certain directions, yet they have left many fields of usefulness to which the association can and doubtless will apply itself.

Present Constitution.

The constitution as amended to date has never been printed, and in order that it may be in the hands of every paper and pulp manufacturer it is herewith presented in full:

ARTICLE I.—NAME.

This Association shall be called The American Paper and Pulp Association, and any member of a firm officer or director of a company or corporation engaged in the manufacture or sale of paper or pulp in the United States, upon favorable consideration by the Executive Council, in accordance with Article VIII., Sec. 3, who shall pay an admission fee of $10, shall be enrolled as a member.

ARTICLE II.—OBJECTS.

The objects of this organization are social intercourse, the consideration of matters of general interest to our trade, and the promotion of its welfare.

ARTICLE III.—OFFICERS.

The officers shall be a president, seven vice-presidents and a secretary who shall act as treasurer; and these officers shall constitute the Executive Council of the Association.

The vice presidents shall be chosen one from each of the following classes viz.: Writing, book, news, wrapping, board, pulp and chemical fibre.

ARTICLE IV.—ELECTION OF OFFICERS.

The officers of this Association shall be elected at the annual meeting by ballot, on a majority of all the votes cast, and shall serve until their successors are chosen.

ARTICLE V.—PRESIDENT.

It shall be the duty of the President to preside at all meetings of the Association and the Executive Council, and to enforce the rules and regulations of the Association.

ARTICLE VI.—VICE-PRESIDENTS.

In the absence or disability of the president, a vice-president to be designated by his associates shall perform the duties of the president and officiate in his stead.

It shall be the duty of each vice-president to report to the Association, at its annual meeting, the general condition during his term of office of the trade and the class he represents.

ARTICLE VII.—SECRETARY AND TREASURER.

It shall be the duty of the secretary and treasurer to keep a record of the proceedings of the Association at its meetings, to keep a correct roll of all the members of the Association; to conduct all correspondence, keeping copies of the same; to receive all moneys due the Association and pay all bills contracted by it, such bills being first approved by the president or one vice-president.

He shall keep a correct account of his receipts and expenditures and shall make a report at the annual meeting or at any other time if so requested by the Executive Council.

The sum of $400 shall be paid the secretary annually to defray the expenses connected with his office.

ARTICLE VIII.—EXECUTIVE COUNCIL.

The Executive Council shall have general charge and control of the affairs of the Association. Three of their number shall be a quorum for the transaction of business.

A regular meeting of the Council shall be held at the time and place of the annual meeting of the Association, at such hour as the president may designate, and special meetings of the Council shall be held on the call of three members thereof

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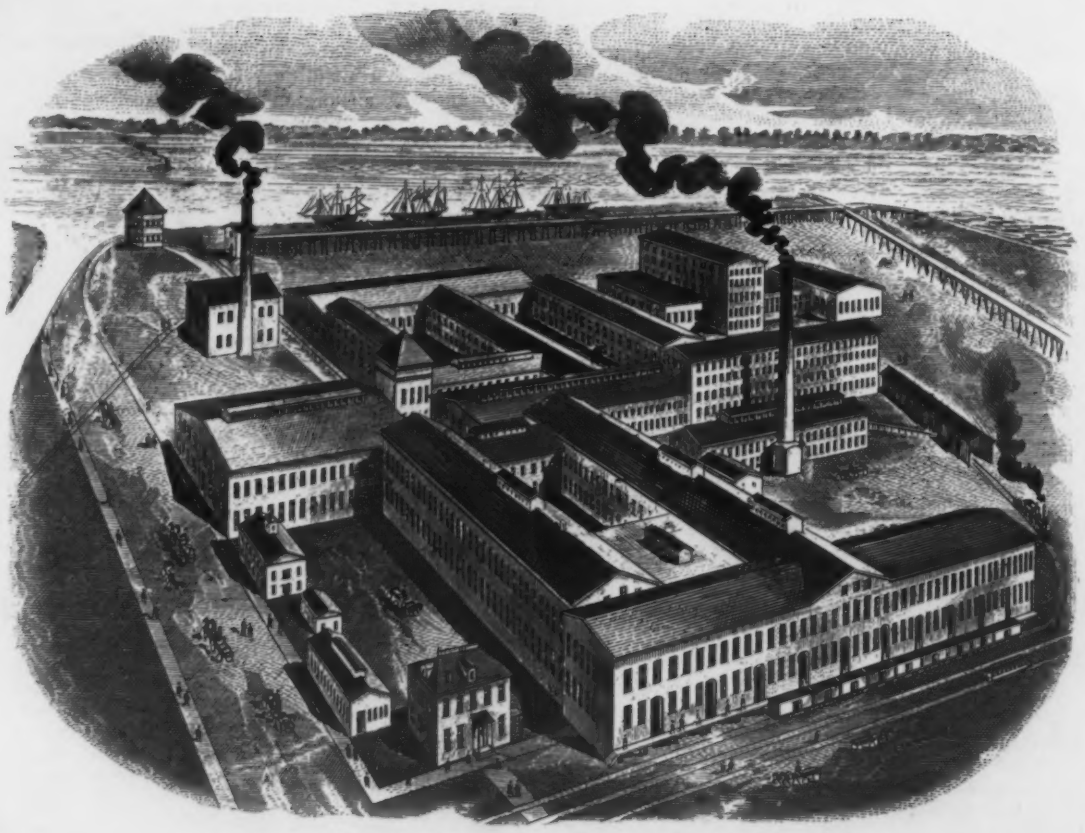

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at such place as they may designate, notice having been given by the secretary, which shall state the object of the meeting.

Each candidate for election shall be proposed and seconded by members of the Association and shall be voted on by the Executive Council, a majority of whose vote shall be necessary for election.

ARTICLE IX.—ASSESSMENT.

To defray the expenses of the Association an annual assessment of $5, payable on February 1st, for the current calendar year, shall be levied on each member.

The Executive Council shall have power to make special assessments upon members if such are found necessary.

ARTICLE X.—MEETINGS.

The Association shall have its annual meeting at such time and place as the Executive Council may determine, notice being given at least two weeks in advance.

Special meetings of the Association may be called at any time by the Executive Council, giving not less than two weeks' notice of the same, and on application of any three members of the Association such special meeting shall be called.

In connection with the annual meeting the Association shall hold a banquet, the expense of which shall be borne by the members participating.

ARTICLE XI.—NON-PAYMENT OF DUES.

Any member failing to pay any sum due the Association from him within three months from the date of its becoming due may be dropped from the roll of membership by the vote of the majority of the Executive Council at any regular or special meeting of the Council.

ARTICLE XII.—AMENDMENTS.

This constitution may be amended at any annual meeting of the Association by a two-thirds vote of the members present, providing such amendment has been submitted to the members in a printed or written notice at least thirty days before such meeting.

This article may be suspended, however, by a unanimous vote of the members present.

Meetings—Annual and Special.

The constitution has always provided for an annual meeting, and additional meetings have been held only as emergencies arose, the power to call such meetings being given to the executive council. Although the association was formed in 1878, yet the first meeting was not held until July, 1879, as already explained. From that time on there has been an annual meeting in July of each year at the Grand Union Hotel, Saratoga, down to and including 1892. In 1893 there was no meeting held on account of the panic which racked the country that year, and also because of the diversion of the World's Fair. It had been determined to hold a meeting in Chicago some time during the progress of the Fair and a call had actually been issued, but the indications were that the attendance would be very small, and so the meeting was reluctantly abandoned. In 1894 there was a meeting as usual in Saratoga in July, at which it was determined to have more special meetings, a preference being expressed for New York as the meeting place, and it was also voted to make the presentation of papers on practical subjects a feature of these occasions. In accordance with this plan a special meeting was held at Delmonico's in New York, on the 30th of January following, thus in a measure atoning for the omission of the meeting in 1893. It was so well attended that it was decided thereafter to hold the annual meeting in the winter time, and this has been done, that of February 20, 1896, being held at Delmonico's, and that of February 24, 1897, at the Waldorf.

Up to this time there had been only one special meeting, that of October 22, 1884, held at the Metropolitan Hotel, in New York, for the purpose of considering the situation created by the cholera scare and the consequent restrictions on the importation of rags. On this same date the Western manufacturers held a meeting in Chicago for the same purpose. There has been but one other special meeting, that of July 22, 1896, at Niagara Falls, being called for no particular purpose except to quicken interest in the association.

There has always been a fair attendance at the meetings, and it has been very representative in character. At the meeting in 1883 there was an unusually large gathering, including quite a large delegation from Wisconsin and other Western points, presumably in recognition of the fact that Colonel French, of Three Rivers, Mich., had at the last meeting been elected president, the first and only president the association has had from the West.

In 1892 a new and attractive feature of the meeting was a mechanical exhibit consisting of models and machinery connected with paper making.

In 1882 there was much discussion at the meeting as to how the membership could be increased and more interest in the association created, showing that the attendance and support of the members was declining, probably in consequence of the comparatively improved conditions of the market over those prevailing at the time the association was first formed. As there had been no enrollment of members up to the time the constitution was revised in 1892, and very few had complied with the mere form of signing the constitution, it was impossible to say just who were to be regarded as members of the association, but Secretary Barker, by communicating with all those who had at any time attended meetings or otherwise shown interest in the association, succeeded in enrolling 171 names, seventy-six being from New England, fifty-five from the Central States and the balance from Ohio and points West of it. This enrollment was estimated to represent 12 per cent. of those who were eligible to membership, 30 per cent. of the number of mills in operation and 47 per cent. of the capacity of those mills.

Increasing Membership.

In 1894 the membership reported to the meeting was 167. At that meeting a committee of ten was appointed to take steps to increase the number, with the result that in 1895 the secretary reported fifty new members, making 207. It was also brought out at this time that Western members were in arrears and withdrawing from the association, not improbably because the association had failed to meet in the West in 1892 or 1893. Between the meetings of 1891 and 1892, William T. Barker, then secretary, and George W. Wheelwright had taken a trip through the West for the express purpose of securing new members from that part of the country. They were successful in adding quite a number, and in fact brought the Western membership to its high-water mark. At that time they had represented that the association would probably decide to hold the next annual meeting, that of 1892, in the West, but they were afterwards chagrined at their inability to persuade the association to make good their representations. Possibly the change in the date of the World's Fair had something to do with this decision.

Had a meeting even in 1893 been held in Chicago possibly the Western membership would have been maintained, but it has from the first appeared to be an up-hill task to get Western men into this association and keep them there, the most plausible reason being the wide geographical separation of the Eastern and Western paper centres.

One more effort was made in 1896 to get new members from the West. As a result of remarks made at the annual meeting by Colonel French, a committee consisting of himself and two Western associates was appointed to take the matter in hand, but they have never rendered an accounting to the association. In 1896 George C. Sherman, the secretary, had the distinction of reporting the largest membership, namely, 210, which the association has yet attained.

Regulating Output.

The association having been formed for the express purpose of combating the ruinous effects of competition resulting from over-production, most of its time and attention at its annual meetings has been devoted to the consideration of means for accomplishing this end. The plan which seemed to commend itself most was that of limiting the output, and as already stated the convention of 1878 recommended a curtailment of the output of one-sixth for six months, and the association was charged with the task of executing this plan. Though so thoroughly imbued with faith in their ability to accomplish something by this means when they came together for their convention, as soon as those present dispersed their faith seems to have departed from them. At any rate, the committee charged with the fulfillment of the will of the association had at the next annual meeting only failure to report. That the project failed appeared to have been due to several causes; in the first place an apathy or perhaps even antagonism to the plan, which was not at all in evidence at the convention, appears to have come to the surface very rapidly afterward, so that not only did some of the committees meet with indifference or opposition, where they expected support, but some of the committees themselves seemed not to be acting in good faith, that representing the New York division making little or no effort to carry out the programme. It was even suggested at the meeting in 1879 that there was a deliberate intention on the part of the larger mills to thwart the efforts of the association, in the belief that no remedy to their ills was possible except that of eliminating some of the weaker competitors, and that therefore the larger mills had concluded that the sooner the worst came the sooner the small mills would be got rid of.

Division Work.

It is also a fact that some of the manufacturers mistook for a natural and permanent improvement a slight quickening of the demand for paper and consequent change in the market for the better, which was due merely to the consumers' alarm at the organization of the paper makers at Saratoga. Such manufacturers, therefore, became more independent in spirit and less willing to co-operate in carrying out the plan of the association.

In contrast with the inertness of the Eastern divisions, the Cincinnati division promptly and readily secured the assent of the requisite 85 per cent. of the mills to the proposed plan of curtailment, but as this division included, of course, all classes of manufacture, it could take no independent action, and as it failed to obtain the co-operation of the Eastern divisions the efforts of its committee came to naught. As evidence, however, that curtailment of output by concerted action is feasible, it may be stated that the writing-paper manufacturers, who had organized themselves independently upon the adjournment of the general convention in 1878, actually did shut down ten days at Thanksgiving time and ten days at Christmas, perceptibly strengthening the market thereby.

The Boom of 1879-80.

At the meeting in 1879 there was a general discussion of trade conditions, but with the recent failure of their former plan fresh in mind the association seemed to lack the heart to undertake a similar task so soon again, and before the meeting in July, 1880, there had been the most unexpected change in the situation; for within that brief period had sprung up, thrived, and all but disappeared that historic boom which caused the only halt in the downward march of prices from 1873 to the present day.

It is interesting to glance at the market prices before and after this boom. In August, 1878, the price of ledger paper was 18 cents. While the price rose much higher during the boom it had already subsided in July, 1880, to 19@24 cents. The corresponding prices for super-sized and calendered book paper were about 11 cents in 1878, and from 10½ to 11½ in 1880, all the gain from the boom having thus already been lost. Print paper, which in 1878 had been selling for from 6¼ to 7½ cents, in 1880 sold for from 7½ to 7¾ cents, whereas during the boom it reached 9 cents.

At the meeting in 1880 Wellington Smith, who as vice-president, in the absence of Mr. Whiting, presided, reviewed the occurrences of the previous twelve months. From this and other sources we gather that the paper market began to improve soon after the last meeting, in common with other lines of business. This improvement has generally been attributed to a succession of unusually heavy crops in the West; to a large balance of exports and a consequent influx of gold, and also to a natural reaction from the depression which had existed since 1873.

After the Boom.

Had the paper market alone thus revived, paper manufacturers would indeed have reaped a harvest, but as a matter of fact, as is usual in such cases, raw materials first advanced, and to a greater extent than the manufactured product. The price of rags jumped up so rapidly that manufacturers were caught, many of them with contracts on their hands to provide paper at the low prices which had been prevailing, which paper they were forced to make out of materials bought at boom prices. Moreover, many, to protect themselves against possible further advance in stock, made contracts for stock while refraining from making contracts for paper, in the hope that by holding off they could get still higher prices; but as the collapse in the price of paper came quite suddenly, they were again caught by having to fulfill their contracts on stock and sell their paper on a declining market. To add to their discomfiture the press, chafing under the unusual burden of higher prices, sought to retaliate upon the paper makers by prejudicing Congress, which was then considering a revision of the tariff, against them, claiming that the advance in the price of paper was due to a combination on the part of the manufacturers. They asked a removal of all protection to the paper makers.

This movement was inconsistently joined in by some high protection organs, and right in the face of the fact that iron had doubled in value and the price of many other articles increased more than paper. However, a committee of paper makers appeared before the Committee on Ways and Means, with Warner Miller as spokesman, and so effectually refuted the representations of the press that Congress made little or no reduction in the protection heretofore afforded all branches of the paper industry. It was in this contest that Mr. Miller received from the press the sobriquet of "Wood Pulp," he having been singled out as a special object of attack on account of his prominence in politics.

So it was that when the paper makers came together in 1880 most of them were in a gloomy state of mind, and, prices having already returned nearly to the ante-boom level, they were again ready to give ear to any plan for checking the decline which seemed likely to, and which did in fact, continue. A. E. Harding, of Ohio, whose voice had always been raised in favor of controlling the output, and who was at this time the chief agitator, very forcibly exploited the advantages to be obtained by limiting the supply to the demand; but at this meeting more prominence was given to the fact that if we could dispose of our surplus we could reach the same ends in a better way than by cutting down the production.

Regulation a Failure.

The whole matter was finally turned over to a committee of ten, who, after considering the most feasible plan for regulating the supply to the demand, recommended closing the mills at 6 P. M. on Saturday until 6 A. M. Monday. The association adopted this plan and empowered a committee to take steps to carry it out, but at the meeting of 1881 this committee reported that they had been unable to accomplish their purpose, having met with indifference, and having encountered a real obstacle in the objections raised by the employees to having their wages cut down in proportion to the hours of work. Another partial cause for their failure was the drought which occurred in the summer of 1880, which, by cutting down the output, to a certain extent rendered their project unnecessary.

At the meeting in 1881 the problem of controlling the market was not discussed to any extent, in spite of the fact that news paper had fallen in price to 6½ cents as a result of the overproduction stimulated by the short-lived boom of the year before.

In July, 1882, the situation was about the same as the year previous, excepting that the depression in the trade may be said to have reached the chronic state in which it has been ever since.

President Wellington Smith brought out the fact very clearly that this depression was due to an unwarranted increase in the producing capacity of the mills. At that meeting still another plan of curtailing production was communicated to the association by Howard Lockwood, embodied in a series of articles to be subscribed to by the mills, the main feature of which were a provision for monthly reports from the mills giving the amount of paper made and on hand, and an expression of opinion upon the necessity for shutting down during a portion or all of the following month. This plan seemed to have been most carefully worked out in detail and to be the most practicable as yet suggested. Although it was adopted by the association, the records fail to show that any steps were taken to carry it out, and there was no further allusion to it at subsequent meetings.

At the meeting in 1883 Mr. Harding, although unable to be present, was so impressed with the desirability and feasibility of the association's undertaking to prevent overproduction that he sent in a long communication, presenting his views in a most masterly, rational and convincing manner, but it appears to have fallen on deaf ears, for the repeated failures of the pas seem to have had a disheartening effect, and already the sentiment was growing up that it was beyond the province of the association to undertake to regulate production.

Notwithstanding the steady decline in prices, the building and development of mills steadily continued, so that in 1883 the table which Mr. Lockwood had compiled showed an increase between 1881 and 1883 of 30 per cent. in the output of all kinds of paper, book and news showing an increase of 26 per cent., and in the following year the increase in book and news was nearly 13 per cent. Much of the annual increment is to be accounted for, not by the allurement of large profits in sight, but by the short-sighted idea that production on a larger scale would forestall loss by reducing the cost of production. Looking back upon the past and comparing the growth of the paper industry with the growth of the country, it is apparent that the main trouble has been simply that the increase in output has been premature, and that could the increment each year have been withheld a year or two it would have been absorbed readily and a fair margin of profit maintained.

Restriction Tried Again.

One more attempt was made at the special meeting held in New York in 1884 to restrict production, but in this case the incentive lay not so much in the decline in the prices of paper as in the untoward advance in the price of rags, on account of the action of the Government in restricting their importation during the prevalence of cholera abroad. After the adjournment of the association, which had simply recommended some plan of cutting down production so as to diminish the demand for rags, special meetings were held by the writing, book and manilla divisions. The manilla division resolved to reduce the output one-third, and the writing division decided to shut down the last week in November, December and January, if 80 per cent. of the mills assented. The Western manufacturers, assembled in Chicago on the same day, were in telegraphic communication with the meeting in New York, and concurred in the Eastern plan.

Prior to the annual meeting in 1886 a movement was started among the mill operatives in Holyoke and vicinity looking to the shortening of the hours of work, a petition being drawn up for presentation at the approaching meeting of the manufacturers at Saratoga. For some reason this petition did not come before the meeting, but there was a discussion relative to the early closing on Saturday, probably in deference to the known sentiment of the employees on that subject, and a committee was appointed to consider the matter. The operatives did not let the matter rest there, but in 1887, at the annual meeting of the association, a committee representing them was present and asked a hearing, which was readily granted. They advocated closing the mills at 6 o'clock Saturday and resuming work at 7

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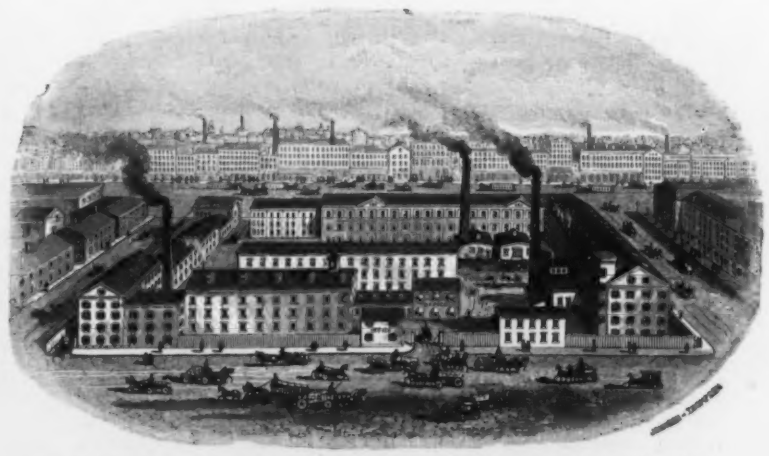

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Monday morning, on the ground that they were being overtaxed by the greater exactions of faster machines and improved product. While many of the manufacturers sympathized with the movement, yet it was the sense of the meeting that if the association attempted to deal with this matter it would be regarded as an interference with private affairs, and not only was a resolution voted down which proposed closing Saturday at 10 P. M. and starting Monday at 6 A. M., but a further resolution was passed discouraging any attempt on the part of the association to control wages or hours or prices.

Renouncing Principles.

It is to be noticed that thus, for the first time, was open expression given adverse to controlling production. In fact, it can be read between the lines of this resolution that those who were opposed to the association's attempting to regulate production took this opportunity to put the association on record as renouncing for the future any such right, and that the eagerness of all to avoid any possible conflict with labor led them into this wholesale, not *annunciation*, but *renunciation* of principles.

While the efforts of the association in the direction of regulating production appear to have been almost fruitless, yet indirectly it is to be credited with a considerable influence upon the market, exerted by the organizations which sprang up in the different branches of the industry, all subsequently to the formation of the national association, and in a measure in consequence of it. There is little doubt that the intercourse of the manufacturers from different parts of the country at its meetings prompted and facilitated the formation of associations such as those which were formed by the writing-paper manufacturers in 1878 and by the envelope makers in 1881; by the strawboard, chemical fibre and straw-wrapping manufacturers at different dates. Each association accomplished considerable in the way of controlling output and regulating prices.

Export Trade.

Perhaps second in importance of the matters considered by the association is the export business. It was not until the meeting in 1880, however, that it turned its attention to this subject. The volume of paper exported at present is of considerable proportions, and no small part of the credit for this is due to the influence of the national association. The exporting of American paper dates back many years, but it was almost insignificant in amount until about 1876. In 1869 the exports amounted to less than $4,000 in value. In 1876 they had increased to $810,000, in 1878 to somewhat over $1,000,000, remaining about the same through 1879 and 1880. It was at this time that the association began to take an interest, and we find that in 1882 the total valuation was $1,618,000, or twice as much as in 1876. While much of the credit is due, as has been said, to the association, more is due to the firm of Woolworth & Graham, who really took the initiative in systematically cultivating an export trade and carried the undertaking along for several years before the association took a hand. Mr. Woolworth in a paper read before the association in 1880 reviewed the export business from the beginning. According to him the exporting of paper in any considerable quantity began in 1876 by a number of manufacturing concerns placing a part of their product at the disposal of Woolworth & Graham at one-third less than the prevailing market price in this country. These mills were forty-seven in number and covered all branches of manufacture. With this leeway as to price Woolworth & Graham succeeded in gaining a foothold in foreign countries, especially European and South American, and were making satisfactory progress when the prices in the home market advanced during the boom of 1879-80, leading the manufacturers either to withdraw from Woolworth & Graham the option on their product or to hamper them by insisting upon immediate action upon quotations, which was in many cases impracticable. Thus the business connections abroad, which had been so laboriously established, were many of them severed. Not discouraged, however, with this result, upon the decline of prices in this country, Woolworth & Graham went to work again, and succeeded not only in regaining the ground lost, but in making decided progress. Among the many obstacles which this firm encountered was the slow means of transportation and communication, which made it hazardous with a fluctuating market to leave quotations open for the requisite period. Again, in 1881, at the annual meeting, Mr. Woolworth made a report on behalf of the committee on exports, in which he stated that 900 tons of various grades of paper had been put in his hands by manufacturers for export, practically without limit as to price. After discussion of the general subject the association passed resolutions asking Congress to encourage the establishment of transportation facilities to foreign countries, especially Central and South America.

Growth of The Business.

At this same meeting in 1881, an exhaustive paper on the subject of export was read by Howard Lockwood; in it he called attention to the very large output of paper within the preceding two years and dwelt upon the necessity of disposing of the surplus beyond the borders of this country. He also discussed in detail the markets and the means of reaching them. He called attention to the growth of the paper industry of the United States as compared with that of other countries, and urged the propriety as well as the necessity of the United States taking the place in the commerce of the world in this branch of manufacture to which the magnitude of the industry entitled it. For at this time the number of mills in the United States was 960, with a daily capacity of about 4,500,000 pounds, of which 1,400,000 were book and news paper, and about 300,000 pounds writing paper; whereas the total number of mills in Great Britain was but 650 and in Germany 545. Mr. Lockwood recommended establishing through concerted action a bureau or agency with correspondents at different foreign points. At the meeting in 1883 Mr. Woolworth, in another of his interesting reviews of the export business, of which, perhaps, he was better qualified to speak than anyone else, referred to the very creditable exhibit by the United States paper trade at the Paris Exposition, which his firm had been instrumental in bringing about. This exhibit he claimed helped to advertise us, and as the quality of the paper was such that twenty-four out of twenty-eight exhibits secured awards, it established a very good reputation for our paper, which materially aided his representatives afterward when soliciting orders, even in remote countries. In 1883, 1884 and 1885 the association appointed export committees which co-operated with Woolworth & Graham. In 1885 a table showing imports and exports of paper since 1875 was received from William A. Russell, a member of the export committee, who was prevented from being present at the meeting, and Mr. Woolworth also again made a report. From that time on the association has in many ways manifested its belief in the importance of an export trade, and has lost no opportunity to encourage it. In 1889 F. G. Pierra, secretary of the Spanish-American Commercial Union, delivered an address before the association advocating and pointing out the advantage of fostering trade with Spanish-American countries. The association showed its interest in the matter by appointing a committee to confer with the Spanish-American Commercial Union with a view to promoting foreign trade relations, and especially to encouraging the establishment of an adequate steamship service. Of this committee Warner Miller was a member, and at the meeting in 1890, in an address to the association, he reviewed the situation and stated that there was then a bill before Congress providing for subsidies to American ships and for adequate remuneration for carrying the mails. This bill he believed would do much to accomplish the desired end.

Reciprocity Treaties.

When reciprocity treaties were under consideration by the Government in 1891 the association instructed the president and secretary to urge upon the State Department the desirability of providing for the free entry of paper into South American ports.

With the greater depression in the paper market of the last few years the association has taken renewed interest in the matter of export, as have also the manufacturers and dealers individually, with the result that the export business has gained steadily, and the hopes of the trade are hung upon its future development.

At the meeting in 1895 W. H. Parsons read an able paper on the export trade and Colonel Haskell spoke on the same subject and advocated establishing an export bureau. The association thereupon appointed an export committee, which was instructed to consider the feasibility of the association conducting a bureau of exports.

In 1896, the National Board of Trade having requested the paper trade to send a representative to South America in a company of twenty-five representatives of other industries, upon invitation of the Governments of Brazil, Argentine and Uruguay, the executive council of the association endeavored to secure some one to go as its delegate, but at the last minute their efforts failed from lack of time.

The paper industry should make the most of the Paris Exposition of 1900 to exploit its resources. By that time we shall control the Latin-American trade, and shall have a good foothold in more than one European market, with a large part probably of the balance of the world's trade possible of conquest. Our exhibit at Paris should be on a scale commensurate with the great stakes. Its preparation should be the work of the American Paper and Pulp Association, and it should be undertaken at no distant day.

The Cholera Question.

Another field of usefulness presented itself to the association upon two occasions when cholera menaced this country, viz., in 1884 and 1892. In the former year the possibility of cholera appearing in the United States produced almost a panic, and in deference to popular feeling the Treasury Department issued orders on August 30 prohibiting the unloading of any rags for three months from September 1. As this ruling covered rags loaded at many points which were entirely exempt from the plague, there was manifest injustice in it. Of course this embargo on rags led to the absorption in a very short time of all the rags in sight, and consequently the prices went up to such an extent as to completely demoralize the branches of the industry dependent on this kind of stock. Therefore the executive council called a special meeting of the association in October in New York city, at which a committee, consisting of W. H. Parsons, who was then president, D. P. Crocker, Warner Miller, William Whiting and W. A. Russell, was appointed and instructed to go to Washington and protest against the injustice of the restrictions imposed upon rag importations; but the obnoxious order of the Government being shortly afterward modified in accordance with reason and justice the necessity was removed for the committee's taking any action.

The situation was very similar in 1892 when the association held its annual meeting, the Government having again issued sweeping and indiscriminate orders involving what was deemed unnecessary expense and delay in the disinfection of rags. There was an interesting and intelligent discussion of the whole subject of infection by rags and a consensus of opinion that the Government had taken unnecessary precautions. The newspapers were, perhaps, largely at fault in creating in the public mind a great prejudice against the introduction of foreign rags into this country. Mr. Barker, who was then secretary of the association, offered resolutions, which were adopted, protesting against the action of the Government, and upon his suggestion a committee was appointed to give expression to these resolutions before the Treasury Department Not content with this, Mr. Barker addressed himself to the task of correcting the false impression which was so generally entertained regarding danger from the importation of rags. To this end he caused to be printed a large number of copies of a pamphlet, which had been published by some eminent medical authority, entitled "An Inquiry into the Transmission of Infectious Diseases Through the Medium of Rags." This pamphlet he distributed widely, putting it in the hands of many of the newspapers which had been instrumental in creating the sentiment which he was endeavoring to overcome.

The committee which was appointed prepared and presented to the Secretary of the Treasury an elaborate, comprehensive and masterly treatise on the subject of rag importation in connection with the spreading of disease. From evidence which they adduced it was demonstrated that there were no data to warrant the obnoxious rulings of the department. The efforts of the committee resulted in some important concessions.

The Tariff Question.

While the association has never sought to involve itself in politics, it has not hesitated to declare itself on any political subject affecting the interests of the paper industry, and although there have been always among the members of the association those who believed in the doctrine of free trade, and perhaps thought the policy of protection might be adverse to their individual interests, yet the voice of the association has always been heard in favor of a protective tariff. At the meeting in 1879 Congress came in for considerable criticism because of what was deemed its proneness to tinker with the tariff without regard to the disturbing influences upon the industries of the country. It would thus appear that the paper industry was satisfied with the tariff as it then existed. In 1880 the association appointed a committee on tariff to look after the interests of the paper industry in Washington. In 1882, prior to the holding of the annual meeting, there had been held a great tariff convention in New York, at which a committee was appointed to petition Congress for a tariff commission. At this convention Wellington Smith, a former president of the association, took an active part and was made chairman of the committee referred to. At the time of the meeting in July Congress had already appointed a tariff commission, and at the instigation of Wellington Smith the association appointed a committee of five to appear before it on behalf of the paper industry, which charge the committee faithfully fulfilled.

In 1887 the contest on the tariff, which resulted in the restoration of the Republican party to power two years later, had already set in when the paper manufacturers assembled in July at Saratoga. The occasion was seized by the advocates of protection to present their side of the subject to the paper makers of the country, and Senator Dawe of Massachusetts was on hand to deliver an address on the tariff. E. A. Hartshorn and other non-members of the association spoke on the same subject and outlined the scope and purposes of the Protective Tariff League, and at the meeting in the following year Mr. Hartshorn again made some remarks to the convention. Warner Miller, then candidate for governor of New York State, in the course of an able address to the association dwelt at some length upon the relation of the tariff to the paper industry. The tariff committee made their report, reviewing their efforts to secure considerate action and suitable protection in the Mills bill, which was then under discussion in Congress. In order to present their case as impressively as possible they had, with considerable labor, gathered statistics of the paper industry by communicating directly with all the mills; but notwithstanding their best efforts they had met with little or no encouragement before the committee of the House. They hoped, however, for better success with the Senate. In addition to the work done by this committee at least one division of the association was at work independently; that was the chemical fibre division, which secured the removal from the free list of chemical fibre, where it had been placed by the committee of the House.

Mutual Mill Insurance.

Not the least of the services which the association has rendered the paper trade is its participation in the formation of the Paper Mill Mutual Insurance Company. It is true this company might have been formed without the assistance of the association, but the facilities which were afforded its promoters of reaching the manufacturers and the indorsement which the association gave to the enterprise were important factors in its formation. It seems that paper mills had come to be regarded by insurance companies as a very undesirable risk, and in consequence the rate of insurance had become so high as to be almost prohibitive. It was in the hope of opening the eyes of the paper manufacturers to a realization that this condition of affairs was due to their own slothfulness and could easily be corrected that Edward Atkinson appeared before the association at its meeting in 1886 and read a paper on the subject of paper-mill insurance, in which he called the attention of the paper manufacturers to the changes which they should make in the construction and equipment of their mills, and which, if made, would warrant insurance companies giving them better rates. Mr. Atkinson had already taken the matter up with a number of manufacturers, with the result that he was then negotiating with a committee of their number for the formation of a paper-makers' mutual company. On motion of George W. Wheelwright before the association a committee of five, of which he was one, was appointed to co-operate with the committee of manufacturers already in existence. That this movement resulted in the formation of such a company, that this company almost from its inception has been a success, and that it has resulted in paper mills getting much cheaper insurance, are facts well known. At the meeting in 1891 an interesting account of the work of the insurance company was given to the association by G. W. Wheelwright, who had been one of the most active in carrying through this project to a successful issue.

Miscellaneous Proceedings.

It might be interesting to briefly cite some of the other matters to which the association has given its attention. At the meeting in 1880 a regulation of the Post Office Department by which samples of paper marked merely with the size and weight were removed from the fourth to the first class was vigorously attacked, and through subsequent efforts of some of the members of the association a satisfactory change in the ruling was made. In 1882 resolutions were passed favoring the bill then before Congress for the reduction of letter postage to two cents. The paper trade having suffered by reason of the systematic undervaluation of imported papers, the attention of the association, at the meeting in July, 1889, was directed to the matter, and a committee on investigation was appointed, which reported in 1890 that it was expected that the McKinley bill, then pending, would correct this abuse. In 1891 a committee was appointed to prepare an exhibit for the World's Fair. Also in 1891 it was resolved that the association was opposed to any change in the standard of value of money and to free coinage of silver, and that these resolutions should be presented to Congress.

There has always been a feeling that the association should undertake the compilation of statistics, and from time to time it has discussed the matter. Something more than the mere table of capacities annually compiled by Howard Lockwood & Co. is needed on which to base any intelligent action looking to the control of product. This idea was advanced in 1879 and at various times since.

In 1892, on motion of Wellington Smith, the association voted for the repeal of the Sherman bill, which provided for the monthly purchase of 4,500,000 ounces of silver.

In 1895 a committee was appointed to investigate the abuses in connection with transportation, and in 1896 the secretary, Mr. Sherman, reported that through the efforts of the associa-

THE NON-ANTEM SULPHITE DIGESTER CO.

Manufacturers of E. MEURER'S PATENT

SULPHITE DIGESTER.

ON ITS MERITS:

AUSABLE FORKS, ESSEX CO., N. Y., Sept. 18th, 1896.

E. MEURER, Esq., Palmer, N. Y.

Dear Sir:—Your favor of the 17th is at hand. We are pleased to advise you that the Digester, 15 x 38 feet, which you lined for us last February, has been running continuously since starting, to our utmost satisfaction. We have scarcely touched the lining since we started up.

We make it a point to go into our Digesters once in every five weeks to examine them, and we have never at any time found it necessary to do more than point up a few seams which had not been sufficiently deep to give the litharge cement a firm hold, so that it possibly flaked.

We were in this Digester a week ago last Sunday and examined it carefully, and could not see that the lining was worn a particle All the seams were perfectly tight, and in fact it seemed to us in better shape than it was when we started up.

We cannot speak too highly of your lining and the satisfactory way in which this Digester has run ever since starting.

Should you desire to refer any parties to us for further information, you are at liberty to do so.

Yours truly,

[Signed] J. & J. ROGERS CO.,
JAMES ROGERS, President.

HARTFORD, CONN., June 4th, 1894.

MR. MEURER.

Dear Sir:—Previous to purchasing a Sulphite Digester with your lining, our Superintendent, Mr. J. C. Duncan, and myself had looked into a good many kinds of linings for digesters, and after very careful and thorough inquiry and investigation we decided that it would be for the best interests of our Company to adopt your lining for the large digester for which we have just contracted.

Yours truly,

[Signed] HUDSON RIVER WATER POWER & PAPER CO.,
THOMAS DUNCAN, Treasurer.

HARTFORD, CONN., October 25th, 1895.

MR. E. MEURER, Palmer, N. Y.

Dear Sir:—In answer to yours of the 23d, would say that the Digester, 38 x 14 feet, received from you, is giving us excellent satisfaction, is doing good work, and we are very much pleased with it. It turns out at every cook an average of 16,000 lbs. of pulp after it is bleached

Yours truly,

[Signed] THE DUNCAN CO.,
THOMAS DUNCAN, Treasurer.

NEW YORK, Sept. 8th, 1897.

MR. E. MEURER, Palmer, N. Y.

Dear Sir:—It gives us pleasure to state your 45 x 14 feet digester is giving us the best possible results. So far as we can see there is no evidence of wear, and up to the present time we have been unable to find the slightest defect in the lining or in the shell, which was built under your specifications. The digester blows clean, and has not caused us a moment's delay since starting. Yours very truly,

[Signed] NEW YORK & PENNSYLVANIA COMPANY,
A. G. PAINE, JR., General Manager.

Express, Telegraph and Railroad Station,
CORINTH, N. Y.

E. MEURER, Esq., Palmer, N. Y. NEKOOSA, WIS., May 24th, 1897.

My Dear Sir:—We have now been using the Digesters you lined for us for five months, and fearing longer silence on my part might be misconstrued by you, I wish to say that there has been nothing to find fault about, and I did not want to write praising your work until after the most thorough test had been made.

After five months of steady use I can only say that the lining is all, and more than all, that you claimed for it. We have had no trouble or expense with it, and every cooking has turned out to be first-class sulphite.

Taken altogether, our plant is a decided success, and the many valuable suggestions which you volunteered have placed us under such deep obligations that I will welcome some opportunity of reciprocating, and hope you will refer any intending purchaser of Digester lining here, for it will give me great satisfaction to show how well you have served us.

Yours very truly,

[Signed] THE NEKOOSA PAPER CO.,
Per T. E. NASH, President.

PALMER, N. Y., March 28th, 1894.

TO WHOM IT MAY CONCERN:

This is to certify that for the past two and one-half years we have had in use in our sulphite mill two Digesters with Mr. Meurer's patent lining, and these Digesters have been running daily since that time with no serious trouble, and as far as we can judge after thorough inspection they are in as good condition now as when first put in. The first cooking was a successful one, and we have no knowledge of a bad cooking during the two and one-half years these Digesters have been in operation. As far as lining is concerned, the only expense was an occasional pointing up of the joints.

In December, 1892, we put in a third Digester with similar lining to the first two mentioned above, except in the pointing up of the joints. We used Mr. Meurer's patent cement for this purpose, and this Digester has been in use almost daily since that time (or up to date, fifteen months) without any repairs whatever, and on close inspection we consider it in as good condition as when it was first put in operation. There have been no leaks during this time, and both the lining and cement we consider practically acid proof.

Our mill has been a complete success from the start, and we attribute a good share of this success to the lining of our Digesters.

HUDSON RIVER PULP & PAPER CO,
WARREN CURTIS, Treas. and Gen'l Manager.

October 12, 1896.

At this date the above statements still hold good. The last mentioned Digester has had no repairs to lining or been pointed up, making a record of three years and over constant use without repairs.

August 11, 1897.

Since the time above mentioned we have relaid the brick linings in the two original Digesters with the acid-proof cement, put them in same condition as the Digester started in December, 1892, and avoid the occasional pointing up of the joints between the bricks.

The Digester that was put in use in December, 1892, is still, after continuous operation for four years and eight months, apparently in as good condition as when originally started, and the expense of repairs to lining in that time has not been much if any over $100. WARREN CURTIS.

E. MEURER, Manager,

PALMER, SARATOGA CO., N. Y.

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5 Orders, 1894 to 1897. 3,800 H. P.

Shoenberger Steel Co., Pittsburgh, Pa.,
7 orders, 1892 to 1896. 2,575 H. P.

Philadelphia Gas Co., Pittsburgh, Pa.,
3 Orders, 1894 to 1895. 2,000 H. P.

Pittsburgh Plate Glass Co., Pittsburgh, Pa.,
2 Orders, 1896. 1,500 H. P.

Salem Iron Co., Leetonia, O.,
3 Orders, 1894 to 1895. 1,000 H. P.

Sharon Iron Co., Sharon, Pa.,
2 Orders, 1894 to 1895. 900 H. P.

Philadelphia & Reading Coal & Iron Co.,
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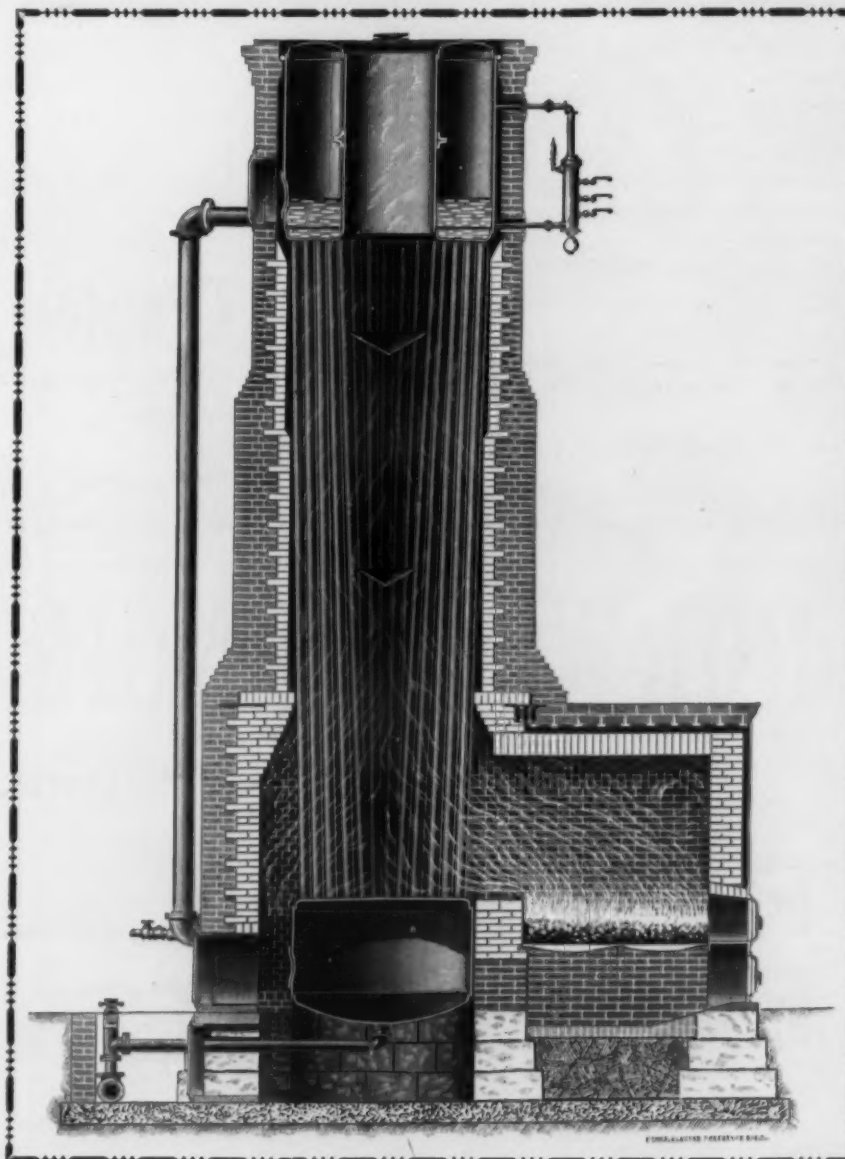
Brown & Co., Inc., Pittsburgh, Pa.,
3 Orders, 1896. 600 H. P.

Fred'k Hood, Watertown, Mass.,
3 Orders, 1896 to 1897. 600 H. P.

National Tube Works Co., McKeesport, Pa.,
3 Orders, 1895 to 1897. 1,200 H. P.

Mahoning Val. Iron Co, Youngstown, O.,
3 Orders, 1895. 900 H. P.



Republic Iron Works, Pittsburgh, Pa.,
4 Orders, 1892 to 1896. 825 H. P.

Union Rolling Mill Co., Cleveland, O.,
3 Orders, 1895. 700 H. P.

Granite City Steel Co., Granite City, Ill.,
2 Orders, 1894 to 1895. 700 H. P.

Dilworth Paper Co., New Castle, Pa.,
2 Orders, 1894 to 1895. 600 H. P.

Cornwall Iron Co., Cornwall, Pa.,
2 Orders, 1895. 600 H. P.

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2 Orders, 1895. 500 H. P.

Zug & Company, Pittsburgh, Pa.,
2 Orders, 1894 to 1895. 450 H. P.

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2 Orders, 1894 to 1895. 400 H. P.

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2 Orders, 1895. 324 H. P.

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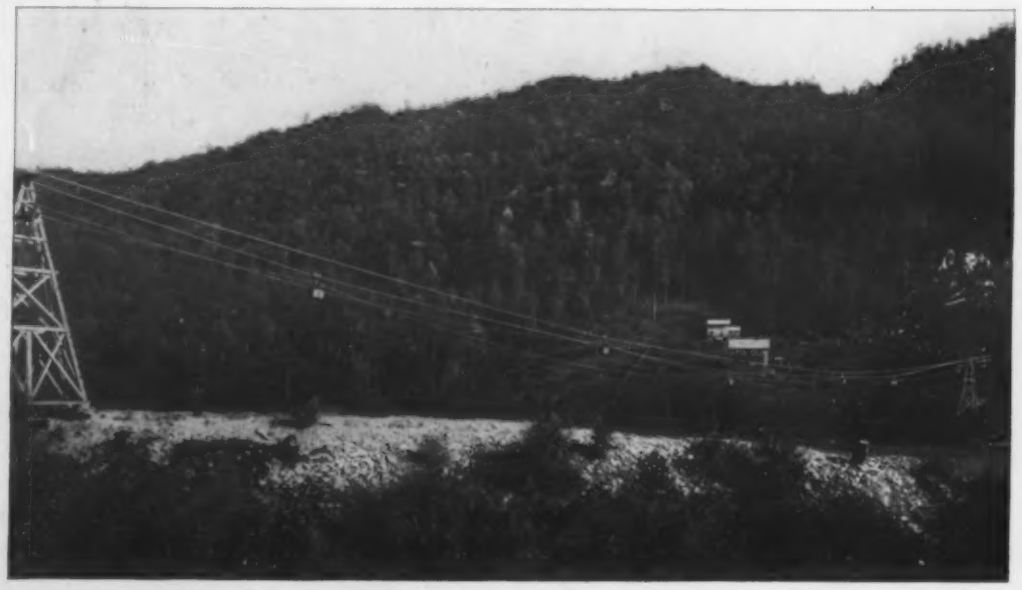

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Gentlemen: With your tramway we are now handling fifty tons of pulp every ten hours. The tramway runs at the rate of two hundred and fifty feet per minute only, and our experience so far shows that we could easily handle several times more pulp than this at same speed, without the slightest difficulty.

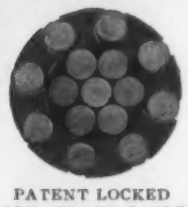
We feel sure, also, that the latter result would not be anywhere near the maximum capacity of the line, but we only speak from actual experience.

When we consider that this tramway takes our product from our wet presses in the mill, carries it across the three channels and intervening islands of the river St. Maurice, the third largest river in Canada, and delivers it 1,500 feet away on the level of our railway siding, and that we do this with three to five horse power, and the labor of only one additional man, at the very most, we are more than satisfied. If there is any other information you require, we shall be glad to give it. Meantime, we remain, Yours respectfully,

THE LAURENTIDE PULP CO. (LIMITED). JOHN FORMAN, Sec'y.

A line built for the Susquehanna Water Power and Paper Co., Conowingo, Md., crosses the Susquehanna River in two spans of 1,700 feet each, the central support, which is on an island, being 100 feet high.

Other lines are described in a book of 170 pages, which will be mailed to interested parties upon application.



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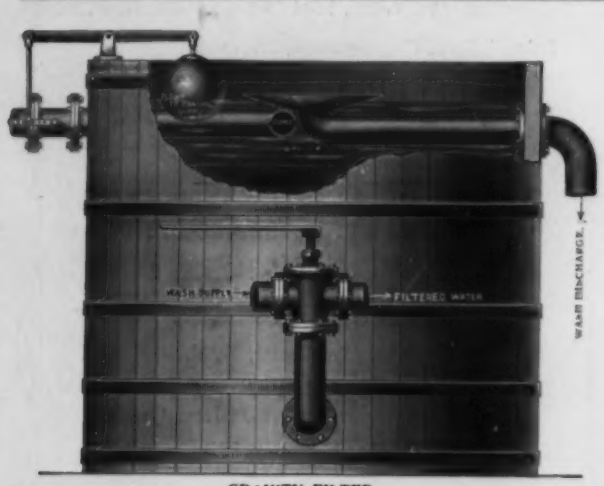

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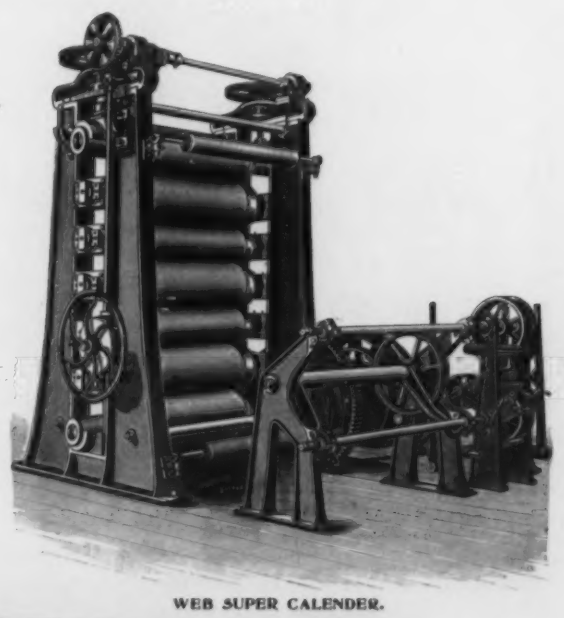

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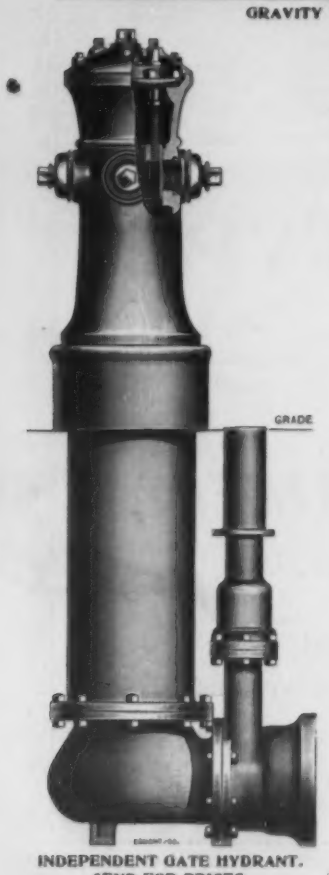

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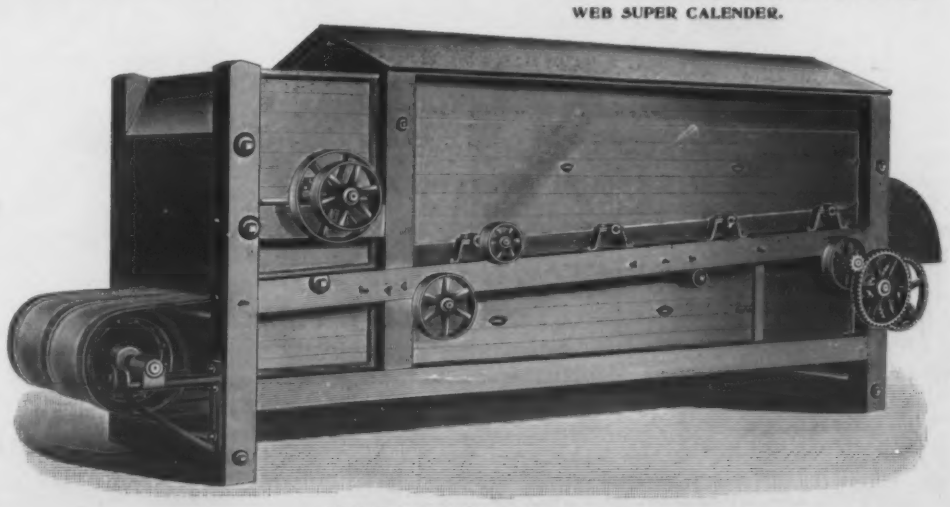
Leather Board Calenders.	Cutlery Machinery.

CATALOGUES FURNISHED UPON APPLICATION. . . . .



WHEAT'S IMPROVED RAG DUSTER.

tion low grades of paper had been changed from the fifth to the sixth class.

In 1896 the association joined the National Board of Trade, and at the last meeting elected delegates for one and two years.

The Social Features.

Even if the direct benefits resulting from the action of the association on these various matters to which it has given its attention seem small, yet it is doubtful whether many will regret the time they have given the association when they consider to what an extent they are indebted to its meetings for their acquaintance with their fellow paper makers and for the broadening of their views from the discussions at the meetings, or through the informal exchange of ideas in conversation. These are the results sought to be promoted by developing the social side of the association. The chief means employed to this end have been the annual banquets, and no history of the association would be complete which omitted to refer to these pleasant occasions. E. Embree, of the American Wood Paper Company, appears to be entitled to the credit of first suggesting a banquet, as it was upon his motion in 1879 that the association voted to have one at its next meeting. There is reason to suppose that these banquets were held annually thereafter, though no allusion to them appears in any available records. As recently as 1889 the banquet was held on the evening preceding the business meeting, but now it comes on the evening following. When the constitution was revised in 1891, in harmony with one of the objects of the new régime, viz., to promote social intercourse, provision for an annual banquet was made in one of the articles. Since these banquets have been held in New York, where more distinguished guests are available, the post-prandial speeches have been of a high order, and the banquets as a whole have compared most favorably with any similar functions occurring in the metropolis.

The Association's Personnel.

In reviewing the history of the association one is impressed with the amount of energy many of its members have devoted to its affairs, especially when considering that this labor has been oftentimes vastly out of proportion to the personal advantage expected to be derived, and that it has in many cases entailed personal sacrifice. Without exception those who have filled the office of president have faithfully lived up to its responsibilities. Therefore it is not invidious to merely refer in passing to the special devotion of Wellington Smith, who presided at four annual meetings, twice as vice-president and twice

THE ECKSTEIN MILL.

as president. He has always been ready to put his shoulder to the wheel for the good of the association. William Whiting, W. A. Russell, and Warner Miller are names identified with the best achievements of the association. They were not only among the most active in organizing it, but have always taken a conspicuous part in its proceedings. The association appears to have been equally fortunate in its choice of secretaries. The amount of labor which devolved upon the first secretary, C. O. Chapin, of Springfield, Mass., who held office for four years until his death in 1882, must have taken no inconsiderable part of his time, and his devotion to the association has perhaps not been equaled by anyone else. His loss was very keenly felt, and at the meeting following h's death his services were gratefully acknowledged in the eulogies which Byron Weston and others pronounced.

The services of W. T. Barker, who held the office of secretary and treasurer for two terms, have already been alluded to, but Mr. Barker has done much more for the association even than appears on the surface, as he by no means confined his efforts to a perfunctory performance of the duties of his office. Among those who have labored for the success of this association should be mentioned W. H. Parsons, whose services were recognized by his election to the office of president; George W. Wheelwright, who, as proof of his interest in the association, accompanied Mr. Barker, at his own expense, on a trip through the West to secure new members; A. E. Harding, of Franklin, Ohio, who was quite indefatigable in his efforts to get the association to undertake to control the output in a systematic manner; J. W. French, twice elected president, who has always been, heart and soul, for anything that promised practical results, and Byron Weston, whose activities were confined to the earlier years of the association, and who occupied the position of president in 1886 and 1887.

Much of the credit for the development of the association along social lines is due to our last two presidents, A. G. Paine and George F. Perkins, both of whom doubled the ordinary work of their office by holding two meetings instead of one during the year. But even the full list of officers, which is here given, by no means covers the whole number of those who have taken an active part in the work of the association.

List of Officers.

1878–79—President, William Whiting; first vice-president, John T. Averill; second vice-president, Wellington Smith; secretary, Charles O. Chapin; treasurer, James A. Hill.

1879–80—President, William Whiting; first vice-president, Wellington Smith; second vice-president, John T. Averill; secretary, Charles O. Chapin; treasurer, James A. Hill.

1880–81–82—President, Wellington Smith; first vice president, O. H. Greenleaf; second vice-president, William Manning; secretary, Charles O. Chapin; treasurer, George W. Wheelwright.

1882–83—President, J. W. French; first vice-president, O. H. Greenleaf; second vice-president, A. E. Harding; secretary and treasurer, Charles O. Chapin.

1883–84—President. J. W. French; vice-presidents, O. H. Greenleaf, J. G. Ditman, J. L. Rubel, George West, George H. Friend, Maurice Fitzgibbons; secretary and treasurer, D. P. Crocker.

1884–85—President, William Parsons; vice-presidents, O. H. Greenleaf, W. R. Sheffield, George R. Dickinson, J. L. Rubel, George W. Russell, J A. Kimberly, J. T. Averill, Moses Newton, H. S. Van De Carr, C. M. Smith, B. C. Faurot, C. D. Brown; secretary and treasurer, D. P. Crocker.

1885–86—President, William H. Parsons; vice-presidents, O. H. Greenleaf, W. R. Sheffield, Augustine Smith, George H. Friend, Charles T. Crocker, J. Van Nortwick, J. T. Averill, Charles A. Dean, H. S Van De Carr, C. M. Smith, C. D. Brown; secretary and treasurer, D. P. Crocker.

1886–87—President, Byron Weston; vice-presidents, John S. McElwain, C. H. Harding, Edward C. Taft, M. B. Mason, George W. Russell Hiram Allen, George West, Moses Newton, H. S. Van De Carr, C. M. Smith, E. D. Brown; secretary and treasurer, E. C. Rogers.

1887–88—President, Byron Weston; vice-presidents, H. S. McElwain, Edward C Taft, M. B. Mason, George W. Russell, Hiram Allen, George West, Moses Newton, H. S. Van De Carr, C. M. Smith, C. D. Brown, J. F. Sieberling, E. H. Clapp, R H. Emerson; secretary and treasurer, E. C. Rogers.

1888–89—President, E. C. Rogers; vice-presidents, T. A. Mole, C. H. Mullen, M. B. Mason, N. T. Pulsifer, C. G. Weeks, Loren Allen, J. M. Waterbury, J. M. Johnson, H. S. Van De Carr, C. M. Smith, C. D. Brown, C. L. Hawes, E. H. Clapp, R. H. Emerson; secretary and treasurer, Oscar S. Greenleaf.

1889–90.—President, E. C. Rogers; vice-presidents, T. A. Mole, C. H. Mullen, M. B. Mason, F. C. Shattuck, C. G. Weeks, Warren Curtis, J. M. Waterbury, J. M. Johnson, H. S. Van De Carr, C M. Smith, C. D. Brown, O. C. Barber, E. H. Clapp, R. H. Emerson; secretary and treasurer, Oscar S. Greenleaf.

1890–91.—President, William A. Russell; vice-presidents, B. D. Rising, C. H. Mullen, Chas. D. Brown, F. C. Shattuck, T. F. Rice, Warren Curtis, D. W. Mabee, Robert McAlpine, H. S. Van De Carr, H. E Mead, E. B. Denison, O. C. Barber, J. A. Kimberly, Samuel L. Montague; secretary and treasurer, William T. Barker.

1891–92—President, William A. Russell; vice-presidents, William Whiting, George W. Russell, F. H. Parks, Robert McAlpine, H. E. Mead, O. C. Barber, Hugh J. Chisholm, A. G. Paine; secretary and treasurer, William T. Barker.

1892–93—President, Warner Miller; vice-presidents, William Whiting, George W. Russell, H. A. Frambach, J. S. Van Nortwick Thomas F. Rice, O. C. Barber, Hugh J. Chisholm, A. G. Paine; secretary and treasurer, William T. Barker.

1894–95—President, Augustus G. Paine; vice-presidents, Arthur W. Eaton, William T. Barker, H. A. Frambach, W. C. Hamilton, J. B. Halliday, Hugh J. Chisholm, Thomas Duncan, O. C. Barber; secretary and treasurer, George C. Sherman.

1895–96–97—President, George F. Perkins; vice-presidents, W. S. Whiting, J. N. Mohr, G. C. Sherman, D. W. Mabee, M. J. Fitch, K. B. Fullerton, A. G. Paine, J. W. French; secretary and treasurer, W. H. Parsons, Jr.

1897–98—President, Hugh J. Chisholm; vice-presidents, W. F. Whiting, J. N. Mohr, G. C. Sherman, S. P. Train, K. B. Fullerton, A. G. Paine, J. W. French; secretary and treasurer, C. W. Lyman.

The Results.

That the association has not accomplished all that its projectors aimed at is a source of regret, but it must be apparent to all that their efforts were not in vain, for the association has certainly, in many ways which they perhaps did not expect, made itself useful to the industry. If one trait of those who have guided its course stands out more than others it is conservatism. Possibly more could have been accomplished if the association had been dominated by a more enthusiastic and headstrong element, but, after all, perhaps, not to have done badly is to have done well, for the association in looking back over the past may now see that if some of its projects of controlling production had been carried out it would have but stimulated anew the very competition which it sought to destroy—a condition which, unless secured by an actual monopoly, can be but temporary and is sure to be followed by fiercer competition when the dogs of war, so to speak, are again set free.

What the future of the association may be no one, of course, can say, but there seems to be a general feeling that as the industry grows the opportunities of this organization will increase, and that perhaps emergencies will arise wherein this nucleus of the great paper industry will find its opportunity and its destiny.

Working on its present lines all that is needed to increase the vigor and usefulness of the institution is a larger membership. This has been sought to be obtained by the modification of the constitution extending the rights of membership to distributers as well as manufacturers of paper, and it is to be hoped that a large number will avail themselves of the opportunity thus afforded for joining an association whose avowed purpose is the general welfare of the industry with which they are concerned. Indifference to such a common cause is too apt to argue narrowness or selfishness or supineness. To join the association is to ally oneself with the most progressive, broad-minded, and successful element of the trade. Let everyone who is capable of seeing that his own success is wrapped up in the welfare of the paper industry reflect that the shortcomings of the association are due not so much to those within it as to those without. Its limitations are inversely proportional to its membership.

The twentieth anniversary of the association will occur next year, and should be celebrated either by some unusual programme at the mid-winter meeting, or, better, by holding a special meeting in the summer at the very time and place of its origin.

In 1807 Gen. Walter Martin erected a mill at Martinsburg, N. Y., which was operated by John Clark & Co. They advertised for rags, the "ad." being accompanied by a poetic address to the ladies, one stanza of which was as follows:

Sweet ladies, pray be not offended,
Nor mind the jest of sneering wags;
No harm, believe us, is intended,
When humbly we request your rags.

PHILADELPHIA AND VICINITY.

REMINISCENCES AS TO PAPER MAKING IN AND NEAR THE CITY.

The Rittenhouse Mill—Other Early Mills—First Experiments in Making Straw, Soda and Sulphite Fibres in the Quaker City—The Changes in the Paper Business—Interesting Incidents of Other Days.

By WILLIAM H. NIXON.

IT is to be regretted that the pioneers in the paper-making industry of North America did not leave to their successors some reliable information upon the subject. It is generally conceded that the first paper mill erected on this continent was in Philadelphia County by William Rittenhause, who had emigrated from Holland a short time prior to 1690 and settled in Germantown Township, Philadelphia County. He was a practical paper maker, as also a Mennonite preacher. As to which he followed for a living the historian is silent. There are many who are engaged in the paper-making business at the present time who would no doubt wish for the choice, and would select preaching as against paper making, with odds in their favor of making a living. About 1690 he erected a mill upon Paper Mill Run, Roxborough Township, Philadelphia County. This mill was destroyed by a flood shortly after it was built and a new one was erected on its

WILLIAM H. NIXON.

site. The third mill in the Rittenhause family was built farther down the Run by William third, a grandson of William first. William third was succeeded in the business by his son Jacob. William third had a son, Nicholas fourth, who had a son, Martin fifth, who was the father of the writer's grandmother, Susanna Rittenhouse Nixon sixth.

From the photograph of a surveyor's plan showing the division of the property of William third to his sons in 1772, I should infer that the third mill was situated on the 8½-acre plot apportioned to Jacob, as he succeeded his father in the business. This plot is on the stream, and shows a building on it. This building was still standing in 1893.

THE RITTENHOUSE MILLS.

William first had a son, Nicholas or Klaas, who was a paper maker, and he evidently conducted the business while the father attended to the clerical duties, as the watermarks in the paper made about that time show his initials, K. R. I have a sheet taken from an old account book used in the early part of the seventeenth century. This sheet, from the date of the writing upon it, 1716, and the watermark "K. R." in it, convinces me that it was made in the first paper mill on this continent.

Later on other mills were erected in the immediate neighborhood, one at the mouth of Paper Mill Run, where it empties into the Wissahickon Creek, and two others down the Wissahickon. All were operated by members of the Rittenhouse family. In later years others were built up the stream and on Cresheim Creek, the last of which disappeared about 1882. In the immediate neighborhood of Philadelphia are Crum, Darby, Mill and Pennypeck creeks, most all of which had their full quota of paper mills, nearly all of which have disappeared.

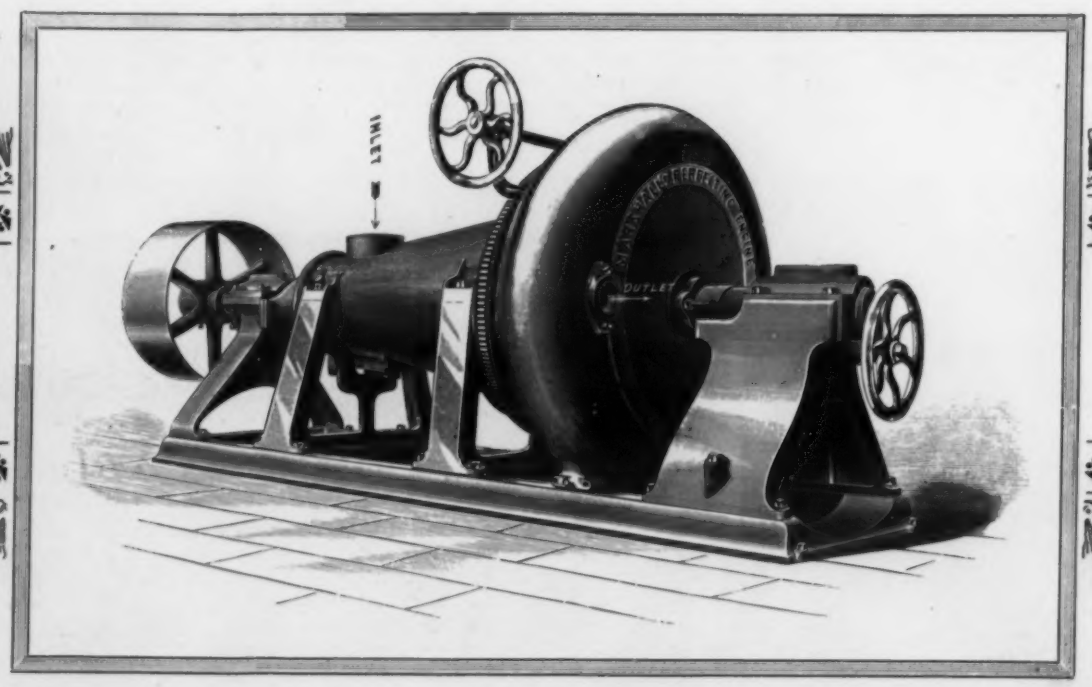
In Manayunk, Philadelphia County, a mill was erected by Joseph McDowell, now owned by his son, Francis W., and operated by Charles W. Another was built by Samuel Eckstein, and made writing and sugar-loaf papers. It has long since been out of use as a paper mill. I inclose you a photograph of it as it appeared in 1839 when in use as a paper mill and operated by

MARSHALL ✻ PERFECTING ✻ ENGINE.

Two Adjustments:

CONE FOR BEATING. DISC FOR BRUSHING.

PATENTED IN U. S. AND EUROPE.



300 IN USE.

This Engine will save from 50 to 75 per cent. of time ordinarily required in beating and also save from 30 to 50 per cent in power required, and at same time make a stronger, better-closed and better-finished sheet of paper than can be made by any other mechanical process.

We supply these Engines on trial, subject to accomplishing the above results.

MARSHALL ENGINE CO.,

TURNERS FALLS,

MASS., U. S. A.

the writer's father. The writer was born in the stone house which stands near the mill.

In 1844 Feinour & Nixon engaged in the business on the present site of Flat Rock Mills. Joseph Duckett erected a mill in the latter part of the fifties and Joseph Stelwagen another in the early sixties. About 1864 Jacob D. Heft, Sebastian Rudolph and John W. Dixon engaged in the business on the present site of the Ashland Paper Mills, opposite Manayunk. In 1864 and 1865 the American Wood Paper Company erected the pulp works at Manayunk. In the fifties E. R. Cope erected a mill on the present site of the extensive plant of W. C. Hamilton's Sons. At Lafayette, a short distance above Manayunk, in the early part of this century, a mill was erected at the Darby road and Forty-sixth street by E. C. & P. H. Warren. In 1866 Morgan Stokes & Nixon erected the City Mill at Twenty-fourth and Vine streets, Philadelphia. In 1873 John Lang built one on the opposite side of the street. About 1882 Alexander Balfour erected his extensive plant on the Delaware River, Richmond, Philadelphia, followed by one by Robert Moorhouse at Bridesburg, Philadelphia.

There are many mills in the counties adjoining Philadelphia, as also in the States adjoining Pennsylvania, the headquarters of which are in Philadelphia. Among these are the extensive plants of the Jessup & Moore Paper Company in Delaware, William M. Singerly's at Elkton, Md.; York Haven's and Conowingo's on the Susquehanna, C. S. Garrett & Sons' various plants and James Ramsey's. The old Ivy Mill in Delaware County, built in the early part of the seventeenth century, owned and operated by several generations of the Willcox family, is the most historical. Its story has been ably written by a member of the family and is very interesting.

Within Philadelphia County the first experiments were made on this continent in the manufacture of bleached straw, soda, wood and sulphite pulps. At the Flat Rock Mills in 1854 Feinour & Nixon introduced the Mellier process for making straw pulp. In those days Feinour & Nixon supplied the *Public Ledger* with its paper, and to W. M. Swaim, one of the owners of the *Ledger* at that time, much credit is due for the successful development of the process. He realized that the supply of rags would not be adequate to meet the increasing demand, and that some other substitute must be had. He encouraged its successful development by paying a price for the paper which afforded a profit. The subscribers to the *Ledger* in many cases returned their papers with the inquiry, lead penciled on the margin, as to why he did not use wrapping paper, complaints being made from a section of the city in which the *Ledger* was served, and in which a large number of goats were kept, that the subscribers failed to receive their paper. Knowing that papers had been served a watch was set to catch the supposed thief, when it was discovered that the goats, attracted by the yellow color and thinking it was straw, ate the papers. The mortality in goats in that section increased greatly, due to the bad quality of the printers' ink used in those days and the improper preparation of the pulp, which was not boiled.

Hugh Burgess informed the writer that his first experiments in the manufacture of soda wood pulp in this country were made in Keen's lumber wharf in West Philadelphia in 1855. He had interested Morris L. Keen in the process, and afterward secured a plant at Spring City, Pa., where the process was fully developed. The writer was present at an interview between Mr. Keen and Martin Nixon in 1859. Mr. Keen was trying to interest Mr. Nixon in the process, and the opinion of the latter then was that pulp made from wood was a good filler but not a fibre. Later on, when Samuel Walsh had become interested in the Spring City plant and was trying to interest A. D. Jessup in the process, Mr. Jessup advised him that English clay was better and cheaper. A few years later Jessup & Moore and Martin Nixon both became large consumers of soda wood pulp. The pulp works at Manayunk were completed in 1866 and the product was largely used by them. The cost in those days was as follows: 1867, $10.76; 1868, $9.38; 1869, $8; 1870, $5.96; 1871, $6 per 100 pounds; now at least 1,000,000 pounds per day is made and it is being sold at $2 per 100 pounds.

I am advised that the first experiments in producing sulphite pulp were made about 1869 at McDowell's mill, Manayunk, then operated by W. W. Harding.

Great improvements have been made in the machinery and in the manufacture of paper. The paper machine has increased in width from 44 inches to 162 inches, and it is so perfect in construction as to make marketable goods the first hour after starting up, as against three months in former times, and at the expense of rebuilding in part to attain even this result. A former paper-machine builder, long since deceased, being questioned as to why this difficulty could not be remedied, stated that he had just erected a machine for a manufacturer of sack paper and had a letter stating that the machine was so perfect and well balanced that after they got the paper through the calenders they shut off the power from all parts except the calenders, reel and cutter, and that the pull of the papers through the calenders ran the rest of the machine.

The speed at which machines are now run is what the historian chooses to place it at. Back in the fifties 75 feet per minute for a cylinder and 100 feet for a Fourdrinier was considered good. I recall a circumstance which occurred at Flat Rock Mills in the late fifties. Some gears had been ordered to admit of speeding the cylinder machine 10 feet per minute faster, on hearing of which the old machine tender, who was short and fat, expressed himself by stating that when they ran a machine faster than a man could walk it was time to quit, and quit he did. Now they run the machines faster than they can sell the paper—so fast as to run the price from 30 cents per pound in 1864 to 1¼ cents in 1897, and with no disposition to stop the gait.

Beaters are so varied in construction as to amaze the old Hollander, and screens so perfect as to screen out all the profit, and very sad indeed is the lot of the paper manufacturer of 1897.

It is with the manufacturer as it is with the machinery. Many changes have taken place in my time. The familiar faces of Charles Megarge, Sylvester, Irwin and Theodore Megargee, Joseph McDowell, Joseph Duckett, Joseph Stelwagen, Charles Wells, E. R. Cope, Elisha Warren, Morris L. Keen, Hugh Burgess, Alexander Priestly, Alfred D. Jessup, B. H. Moore, Henry and Martin Nixon and Casper Garrett have disappeared. Of the old stock there are surviving W. C. Hamilton and Parker Warren, both approaching the four-score mark, and we who were the "boys" are becoming the "old men" of the trade.

PAPER-MAKING MEMORIES.

CURIOUS HAPPENINGS IN THE RUNNING OF OLD-TIME MILLS.

The Machine Tender Did His Own Firing—Emergency Calls—Butler & Hunt's Mill—The Trivial Cause of One Failure—The First Revolving Globe Boiler—A Calamity Meeting in Chicago.

By EDWARD CONLEY.

WHEN the editor of THE PAPER TRADE JOURNAL first requested me to write something of an historical nature about paper making for the twenty-fifth anniversary number of the paper it seemed an easy matter, but when I look back for incidents to make up such an article I find that they consist almost wholly of personal experiences, and this must be taken as my excuse for using the personal pronoun so frequently. In May, 1852, I began paper making in one of Butler & Hunt's paper mills in St. Charles, Ill. My first work was tending a continuous cutter at $2.50 per week.

There were no reels on this machine. The paper was taken from the dryers to the cutter, so that when the paper was running over the machine the sheets were coming from the cutter continuously. There was no chance for a rest, except when the paper broke on the machine or the machine tender would "spell" the cutter boy.

The machine consisted of a making cylinder, first press, three 36-inch dryers and a cutter. The machine tender had to do his own firing to make steam to dry the paper, and it was not an easy job, as I discovered three years later when I ran the same machine. We used nothing but green wood in the furnace, and when one end of the stick was burning the sap was running out of the other end.

We had no valves between the steam boiler and the drying cylinders on the machine, so that the only way to regulate the drying of the paper was by poking the fire in the furnace when the paper was damp, and to open the safety valve and blow off steam when it was too dry.

I have a very vivid recollection of my experience in another of the firm's mills in 1855, where they made print paper. The mill had a 36-inch machine, and the largest sheet that had been made on it for a year was 29 x 43, called "Long John," but we received an order one Saturday night for six reams 31x46, called "Elephant," to be in Chicago on Monday afternoon, in order that one of the daily papers could get out its Tuesday morning edition. It was not a large order, but enough for the entire issue; but inasmuch as 29 inches was the widest sheet that had been made on the machine for some time, I had a lively time from 1 o'clock Monday morning until daylight in making six reams 31-inch paper on a 36-inch machine. Many of the big Chicago daily papers now waste more than six reams every morning in getting out the first edition. As I said before, the mills were owned by Butler & Hunt. O. M. Butler was the active man. His brother, J. W. Butler, now head of the J. W. Butler Paper Company, of Chicago, was at the head of a country dry-goods store. He sent out peddlers' wagons with a full line of writing papers and other goods, which were exchanged for rags. At that time soft woolen rags were not saved as they are now. I have seen as much as 10 tons of woolen rags, which had been dumped on the bank of the river behind Butler's store, waiting for the spring freshet to carry them away. Ten years later, during the war, I sold the same kind of soft woolen rags at 19 cents per pound, and new blue clippings at 45 cents per pound.

We used piece felting exclusively as a wet felt. In fact, we could not put an endless felt on that machine unless we took it almost all apart.

The ends of the wet felt were nicely darned together, and it was part of my duty to go to the store, where all supplies were kept, and ask J. W. Butler for needles and yarn, and when a needle was broken or lost it was always a painful surprise to J. W. that we were so extravagant.

About 1853 two of the Richmond brothers bought from Butler & Hunt two old rag engines and an old steam boiler and moved them to Appleton, Wis., where the Richmonds started a small paper mill. This was the beginning of paper making in the Fox River Valley, Wis.

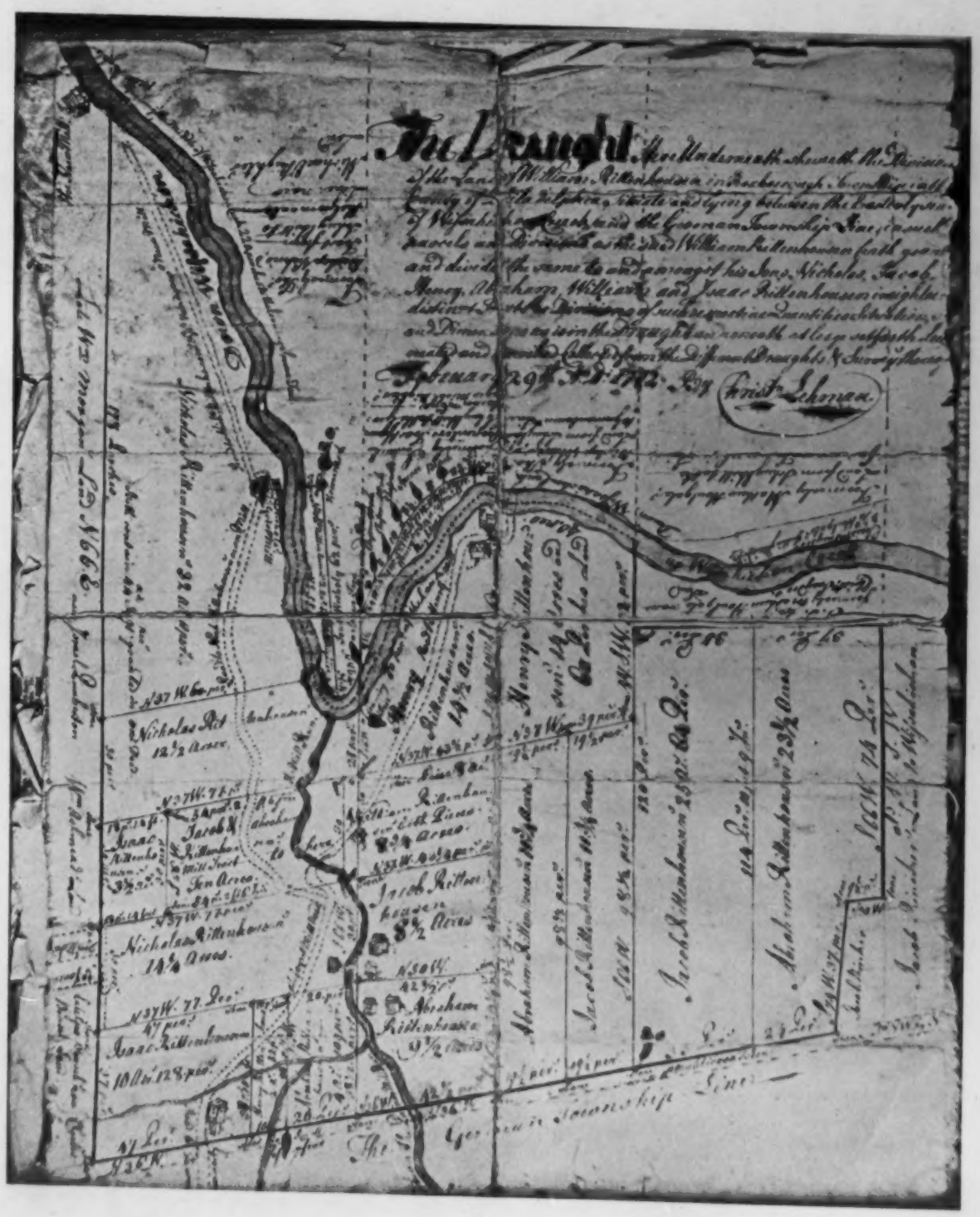
From July, 1857, to September, 1859, I worked in a mill at Humboldt, Wis., three miles north of Milwaukee, part of the time running engines and part of the time running machine.

The mill was owned by Noonan & McNab. We made book papers from white and light-colored rags for the State of Wisconsin.

Mr. Noonan, one of the owners, was postmaster of Milwaukee under President Pierce. Noonan was a well-known politician in the State of Wisconsin, and will live in the history of the State through the many lawsuits he had with a Mr. Horton about water power at Humboldt, where Horton had a flouring mill just above the paper mill. The decisions of the courts of Wisconsin in these cases are quoted in all States in the Union where the questions of water power and riparian right are involved.

Mr. Noonan had a rather quick temper, and when he was provoked he not only swore at a fearful rate, but he would jump his feet up and down on the floor, and pound his fists on the table at the same time. If some composer like Wagner had set his passion to music it would have been a symphony in itself.

In the fall of 1859, after I left Wisconsin, I stopped at Dayton, Ohio, and worked a short time in a wrapping mill for a Mr. Wyman, who was a son-in-law of Mr. Rutledge, of Dayton, a well-known paper maker. Mr. Wyman was not a practical paper maker, but he was a great revivalist, and every day or two handed around tracts for the hands to read. When we had five or six cars of wrapping paper made up Mr. Wyman shipped it to Memphis. It went by rail to Cincinnati, and from there by steamboat to Memphis.



SURVEYOR'S PLAN OF THE RITTENHOUSE ESTATE.

By Use of.. **Green's Economizer**

Write for Book on **"Green's Economizer."**

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SAVING IN COAL

15 TO 25 PER CENT.

Can be applied to any existing Plant or type of boiler.

Special advantage in Paper Mills.

Sole Manufacturers in the United States, **THE FUEL ECONOMIZER COMPANY, of Matteawan, N. Y.**

The Sault Ste. Marie Pulp and Paper Co.

CANADIAN WHITE SPRUCE GROUND PULP CAREFULLY PACKED FOR EXPORT,

DRY OR MOIST, AND PERFORATED IF REQUIRED. CAPACITY OF MILLS, 300 DRY TONS DAILY.

Sault Ste. Marie, = = Ontario.

Mr. Wyman thought it would be a waste of time to put the paper under a screw press and compress the reams into small packages, as was the custom before it was tied up; so when the paper was stacked up in the steamboat the bundles became compressed, and when it was put upon the levee at Memphis the strings all slipped off and the paper was scattered in all directions and became a total loss. This caused Mr. Wyman to suspend operations.

I met Mr. Wyman in Philadelphia about eighteen years afterward. He was yet peddling tracts, and remarked that he was not cut out for a paper maker.

At the beginning of the war, in 1861, I was located at Cincinnati, Ohio, running machines for Nixon, Chatfield & Woods. We were making print paper from straw and rags. We prepared our own chemical straw pulp, and inasmuch as the ordinary paper maker of that day was not very well versed in the science of chemistry we frequently failed to thoroughly causticize our alkali liquor. Hence the straw would not be properly cooked, and the stuff would work slowly on the wire and the paper would be harsh and brittle and would work badly on the presses. Again the straw was cooked in a stationary boiler, and occasionally, if the steam was put into the boiler too rapidly, the straw would be boiled too soft in the centre of the boiler and raw on the outer edges, which would make an uneven quality of paper. Murat Halstead was editor and proprietor of the Cincinnati *Commercial* and frequently we would receive a letter of complaint from him. While the printers in his office might be able to read Halstead's writing, there was nobody around the mill who could. In fact, there was nobody around the mill who cared to read his letters, for when we saw a letter head with the Cincinnati *Commercial* printed at the top, we would all say: "Here is hell again."

We soon learned to make a caustic liquor, but we had trouble with bad cooks until we changed our boiler from a stationary to a revolving boiler some years later.

In 1864 I became assistant foreman to John Carr. Thomas Nixon was general manager. On June 1, 1865, Mr. Nixon withdrew from the firm, the partnership having expired by limitation at that time. Mr. Carr became general manager, and I foreman. The next October Mr. Carr died, and I at once became general manager.

As I said before, we had more or less trouble with bad cooks on account of our boiler being stationary. At that time it was not thought feasible to keep so large a boiler moving when it was loaded. The boiler was made in Philadelphia in 1860 under the patents of Martin Nixon, who had two of the same dimensions running in his mill at Manayunk, Philadelphia. They were 14 feet in diameter, globe shape, and made of three-quarter inch iron, forged on templets and put together with three rows of rivets. It was mounted on journals and was turned by hand, only half way around, to empty and fill. The weight of the boiler was 14 tons when empty. In 1866 I determined to change this boiler so as to revolve slowly while the straw was cooking. This was done by fitting a large worm wheel in segments around the centre of the boiler and driving it by means of a screw on a 4-inch shaft.

This was the first globe boiler that was ever revolved in this country while cooking the stock, and it worked so well for us that Martin Nixon, of Philadelphia, came out to see it in 1870, and at once changed both of his boilers in the same way. By the way this same boiler was the means of revolutionizing the manufacture of strawboard a few years later.

It was some pleasure to be in the paper business during the sixties. The mills were overrun with orders. I remember one Saturday afternoon that Benjamin Graham, of St. Louis, came to the mill and begged me to make for him 100 reams of 28x42. Finally, in order to help him out, I ran the mill until 6 o'clock Sunday morning.

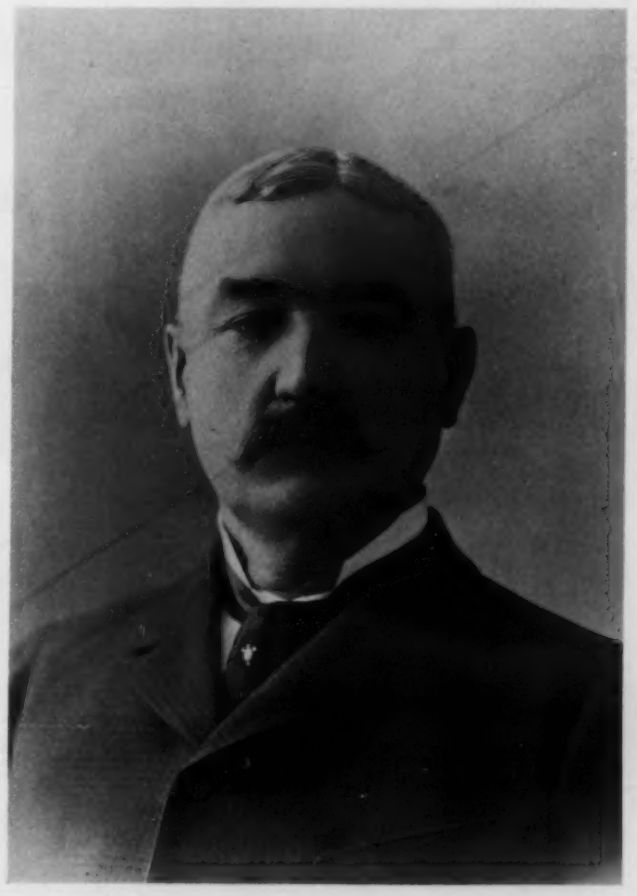
After I became manager of the mill I speeded the machine up to 110 feet, which was considered fast running thirty years ago.

One day about 1867 Wm. Beckett, of Hamilton, Ohio, came into our machine room and asked me how fast the machine was running. I told him about 110 feet. He said it was too fast and that I would tear the machine to pieces. About two hours later Mr. Chatfield and Mr. Woods came up to the mill. I met them outside the mill door, and the first thing that Mr. Chatfield said was that Mr. Beckett said I would wear the machine out in three or four years if I continued to run it so fast. I said: "Mr. Chatfield, suppose we do wear the machine out in four years. We made $56,000 last year, and at that rate we can afford to buy a new machine. But," I said, "as a matter of fact, the machine must be kept in first-class order, or we could not make paper on it at a fast speed."

Mr. Woods and Mr. Chatfield looked at each other for half a minute, and finally Mr. Chatfield turned to Mr. Woods and said: "William, I guess Ed is all right."

Even in those days the paper trade had its calamity meetings. Along in the late sixties I attended a meeting of paper manufacturers in Chatfield & Woods' office, to talk over the break in prices. Colonel Friend and Charles Batchelder, of Lockland; Colonel Mead, of Dayton, and several others, were present. Charles Batchelder got up and in a very solemn tone of voice said that he was free to confess that he had sold news paper as low as 17 cents a pound. Colonel Mead sprang to his feet and said: "Hell; I don't think that anybody need apologize for selling paper at 17 cents. I have sold some at 16½ cents, and I would like to take an order at that price to-day."

In 1873 the *Commercial* made arrangements to put in a Hoe perfecting press and print from a roll of paper. We had no experience in making news paper in rolls, and as I was going abroad to look into the system of recovering spent alkali, Mr. Halstead gave me a letter of introduction to Mr. Smalley, who represented the New York *Tribune* in London. It was thought that Mr. Smalley could put me in the way of seeing the rolls of paper used by the *Times*. I failed to find Mr. Smalley in London, but through letters I had from Howard Lockwood I was in-



EDWARD CONLEY.

vited by one of the Rigby Brothers, who had been in this country the year before, to visit their mills near Manchester, England. They were running ten machines, several of which were making rolls for the London *Times*, and I must say that I never saw better rolls of paper before or since. After going to the World's Fair at Vienna, I returned home and made roll paper to the satisfaction of Mr. Halstead.

While I was away my brother James, who was my assistant, had charge of the mill, and during that time a young man, of light complexion, came to the mill with samples of ground poplar pulp, price 6 cents, delivered. My brother decided to try a small carload. At first he put in one bundle to the engine, but continued to increase the furnish up to 30 per cent., which at that time was thought to be the limit. This was probably the first ground wood used in the Miami Valley. The young man who sold that car of pulp was Major Ackerman, of the well-known firm of Perkins, Goodwin & Co.

Some time after Warner Miller, afterward Senator Miller, came to Cincinnati and sold us a car of spruce pulp, which turned out to be very coarse and uneven, so that ended the experiment with us.

About 1863 the rebel general John Morgan made a raid into Ohio, and for a few days the city of Cincinnati was besieged. All business was suspended, and all the able-bodied citizens, together with the squirrel hunters from the interior of the State, were behind trenches on both sides of the Ohio River. The city paper mill was the only factory that was permitted to run, and that was for the purpose of supplying the newspapers of Cincinnati with paper. All the help were given passes by the provost marshal to pass the guards at all hours of the day and night.

In March, 1876, the city of Cincinnati raised the grade of one street 17 feet and that of another 12 feet. This left the machine room and engines under ground, so the mill was closed down for good.

In May of the same year I received an appointment as one of the judges on Group XIII. at the international exhibition in Philadelphia, and afterward I served on the board of appeals, which kept me busy until the exhibition closed, when I took up my residence in New York city and did more or less writing for THE PAPER TRADE JOURNAL. About 1873 I contributed to THE JOURNAL a short account of early paper making in the West, and in 1876 a short account of the textile fibres exhibited at the Philadelphia Centennial.

In 1878 O. M. Butler, the first man I ever worked for, was living in New York selling the product of a strawboard mill located at Lockport, Ill. He called at my office one day and said that he would like to talk with me about boiling straw, to make strawboard, in a close boiler, as he knew that I had considerable experience in making straw pulp. We talked the matter over for an hour. I told him that by using a globe boiler that rotated the straw would be all cooked alike, which would make a tougher board, and that it would be thicker for the weight than a board made from straw boiled in an open tub, while in addition he could use less lime and there would also be a large saving in fuel, as there was no such chance to waste steam as there was when he cooked in an open tub. I advised him to buy the globe boiler then standing idle in the mill at Cincinnati. Mr. Butler requested me to write to his partner, J. L. Norton, at Lockport, Ill., giving him my reasons for recommending that style of boiler. I did so, and shortly after I sold Mr. Norton and Mr. Butler the globe boiler then at Cincinnati for $2,250, though it cost $7,000 before the war. The boiler was taken apart and set up in their mill at Lockport This was the first globe boiler ever used in a strawboard mill, and it virtually revolutionized the strawboard business.

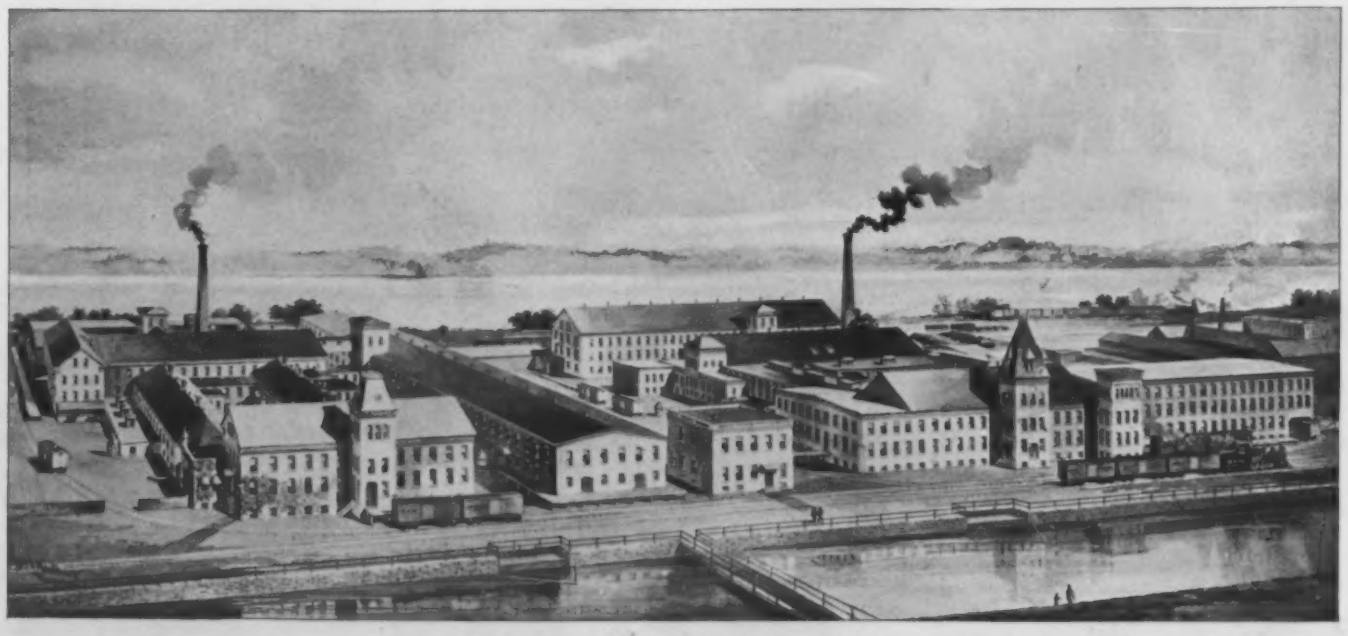
Four or five years ago I met Mr. Norton in Saratoga, when I recalled the above transaction. Mr. Norton said that if we had had sense enough at that time to cover the improvement in the manufacture of strawboard by patents there would have been a fortune in it for all concerned.

While traveling among the pulp mills in Europe in 1878 I noticed that the strongest sulphite pulp was made in stamp mills, and that there was nothing in the way of a beater that gave full satisfaction. The next year I patented a revolving bedplate engine, and after a thorough trial it has more than filled my most sanguine expectations. I am willing, however, to leave it to the judgment of the future historian whether or not I have advanced the art of paper making.

For the last fifteen years I have been principally engaged in missionary work, and in that time I have seen many commercial missionaries in the paper trade rise and fall. Some men are adapted for the road and others are not. I remember taking supper at the Burdick House in Kalamazoo, Mich. Two young men were at the same table. One of them asked the other how he found business. He said: "Very slow; I have been out three weeks and I have received three orders, two post-office orders and an order to come home." It was quite evident that he had missed his vocation or had a mean house back of him.

On the other hand I knew a young paper maker who started out on the road over twenty years ago. On his first trip he stopped at the Grand Pacific Hotel in Chicago. Seated at the same table with him was a gentleman who had a pint bottle of claret before him. The young drummer, thinking that the hotel served wine as well as soup, ordered a waiter to get him a wine glass. Then he reached over and helped himself to the stranger's wine. In fact, he took a second glass, and did not discover his mistake until at dinner the next day, when the waiter told him that he drank the stranger's wine.

That man now is one of the most successful and one of the most popular salesmen on the road, and many a bottle he has shared both with his friends and customers since that Chicago incident.



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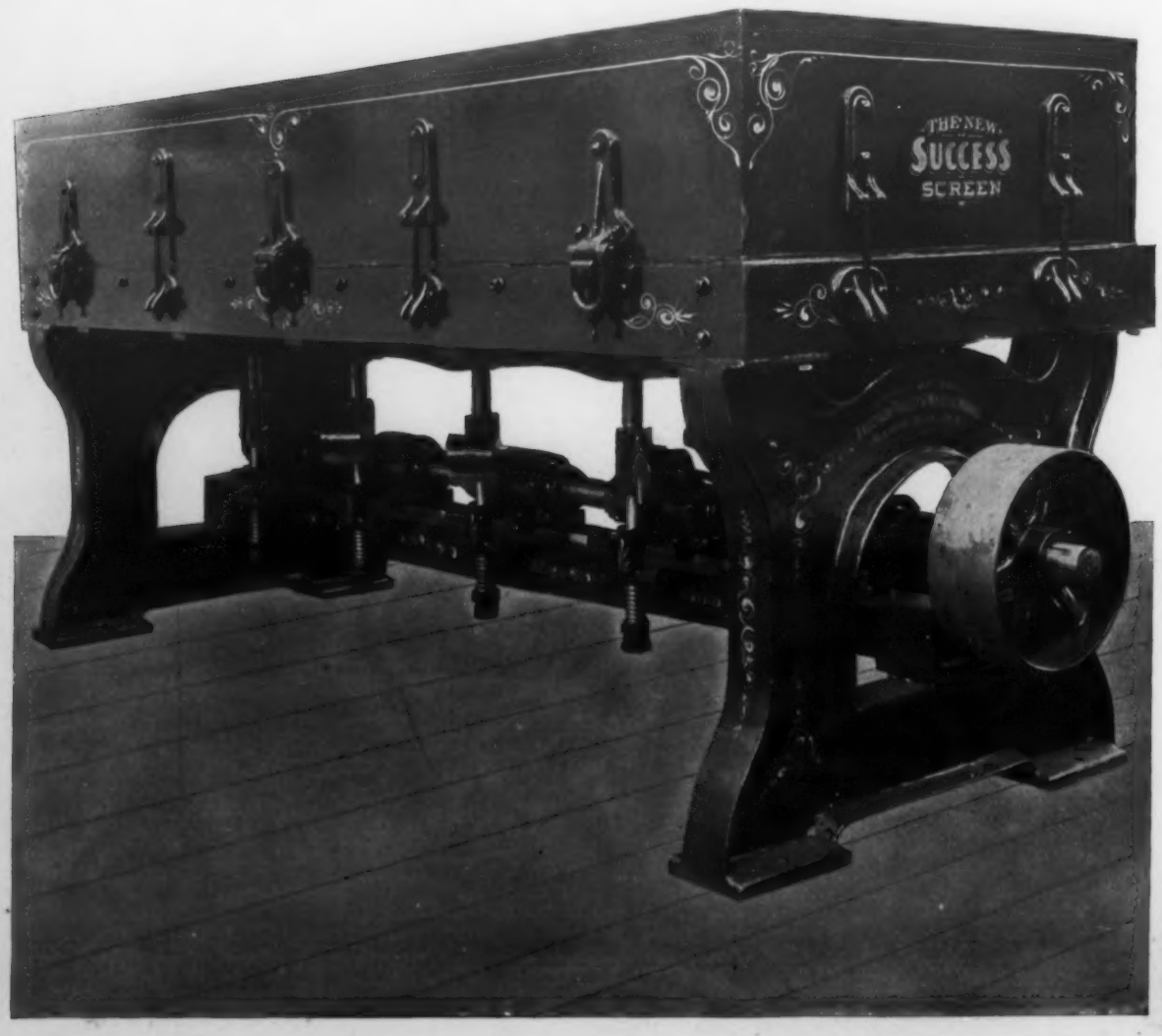

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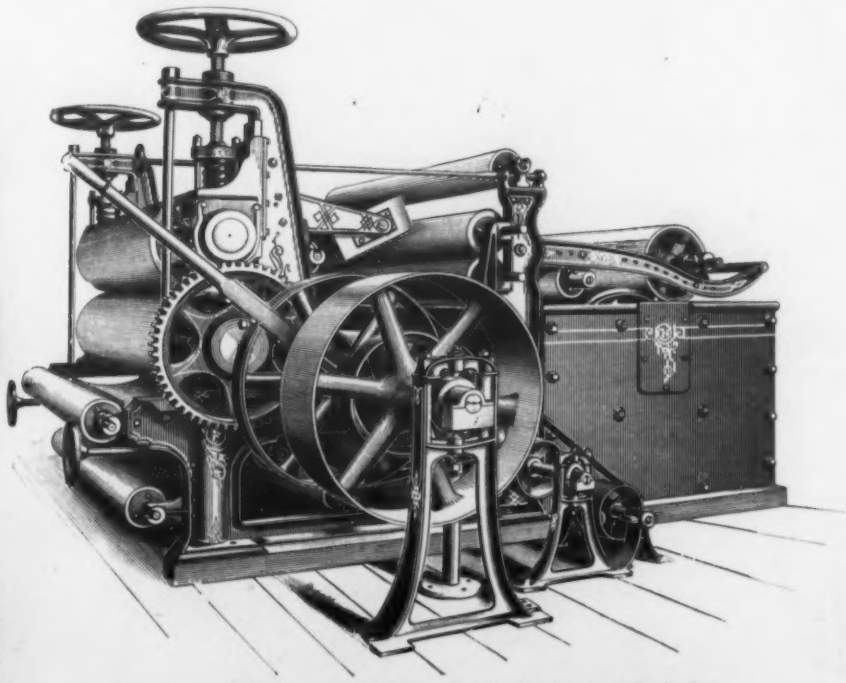

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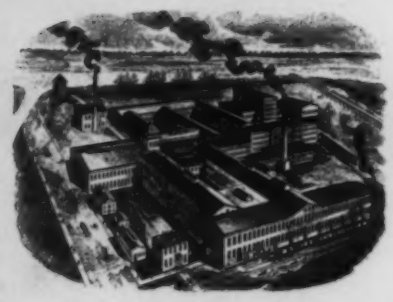

Niagara Falls Paper Co.

Niagara Falls, N.Y., Aug. 23, 1897.

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Sandy Hill, N. Y.

Gentlemen:-

We have ten of your latest improved, extra heavy, three pocket, 24"wood,16" diameter hydraulic cylinder wood pulp grinders in operation in our mill, coupled up five in each line. The grinders are built of ample strength and capacity in every particular to stand the work, and are so constructed that, if set up on good foundation, there is no vibration in any of their parts. Another important feature about the grinders is that they are so arranged that there is no waste of pulp and the machines can be easily kept clean.

We also have 20- 12 x 43 eight plate Success screens in our sulphite mill, and 44- 12 x 43 ten plate Success screens on our paper machines and in our wood pulp mill, with which we are greatly pleased. The four double 36" x 94 cylinder wood pulp separators are giving us the best of satisfaction.

We do not hesitate to reccommend any of the machinery that you have furnished us.

Yours truly,

Niagara Falls Paper Co.,

J C Morgan

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Gentlemen:-

We have some 44 of your screens running at our mills, also 12 Pulp Grinders, also 5 double Reducing Cylinders, all of which are giving us perfect satisfaction, proof of which is in our giving you orders for these machines from time to time.

We trust you will still continue to give the trade the best there is in the market. Should we discover any defects in any of your machinery, we shall take pleasure in notifying you.

Yours very truly,

Otis Falls Pulp Co.,

Edwin Riley Manager

Dictated.

Manufacturers, SANDY HILL, N. Y., U. S. A.

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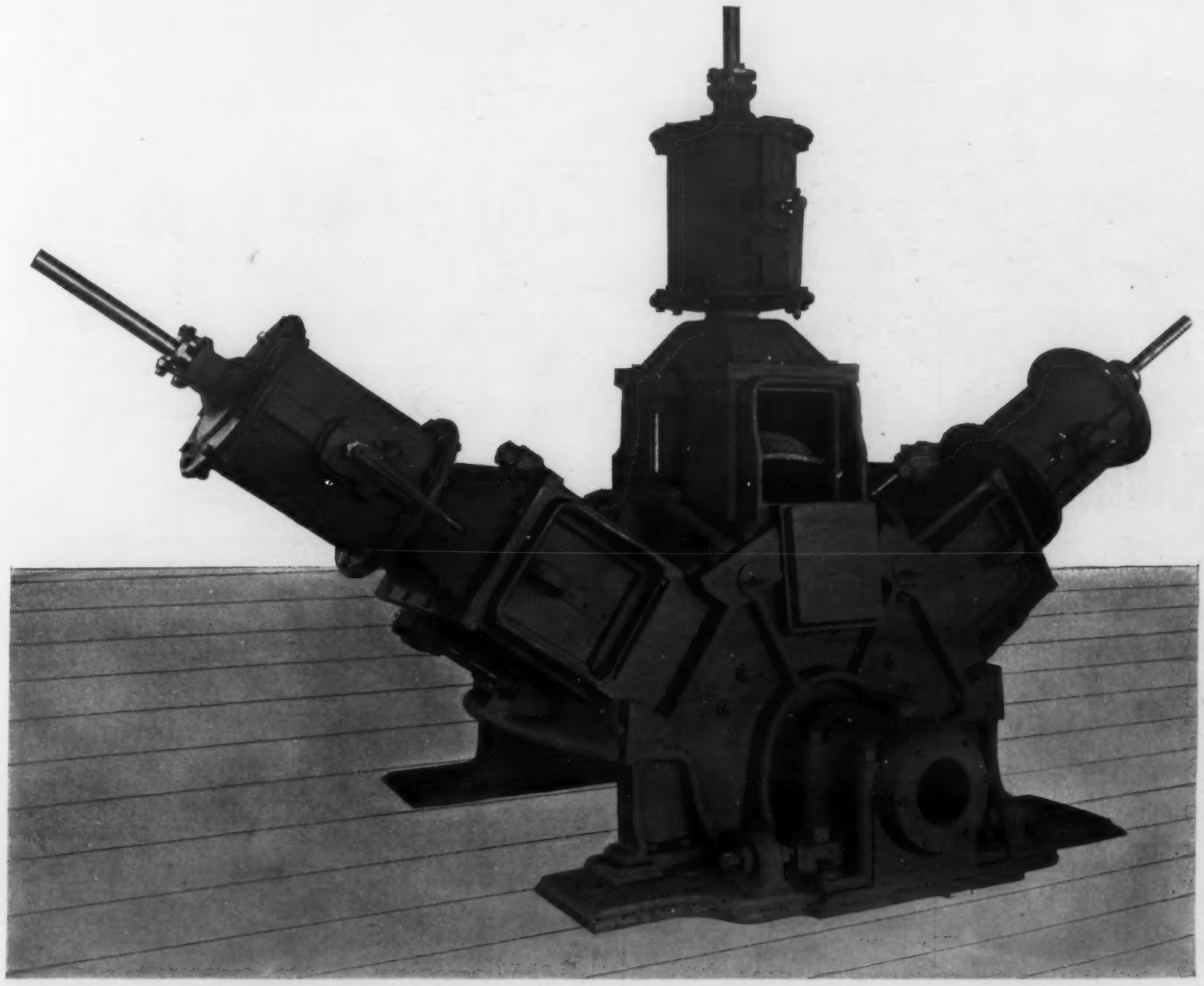

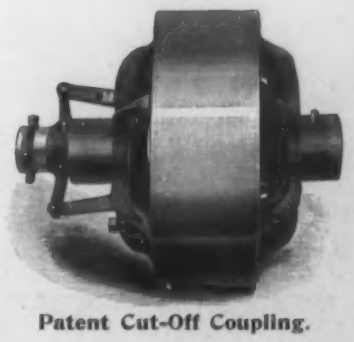

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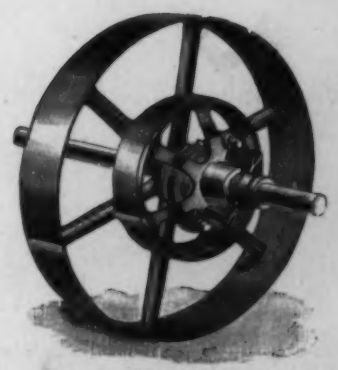

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Paper Manufacturers.
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The Friction Pulley & Machine Works.,
Sandy Hill, N.Y.

Gentlemen:-

We have got forty (40) of your make of wood pulp grinders in use in our various mills; we find them equal to any grinder and superior to most of any that we have ever seen or used. They are modern in every requirement and we do not hesitate to say that if we were in the market for wood pulp grinders that we would be glad to place our order with you.

We would be pleased to show our grinders and wood pulp mills to anyone whom you may wish to see them.

We have also got in use one hundred(100) of your latest screens and thirty-four (34) of your latest pattern wet presses; these we consider equal to anything that has yet been placed on the market, both as to capacity and durability.

Yours very truly,
Glens Falls Paper Mill Co.
Geo. N. Baker Treas.

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BENTON TURNER, PRES'T.
ROBT. H. GUIBORD, SEC'Y & TREAS.

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Friction Pulley & Machine Works,
Sandy Hill, N. Y.,

Gentlemen:

We have in successful operation at our mill at Freydenburgh Falls fourteen grinders, eleven wet machines and a large number of friction pulleys,---all of your manufacture. The substantial character of our machines, their economy of operation and repair and their large capacity has been a source of remark by visitors and of constant satisfaction to us.

If we were in the market atb the present time we should unhesitatingly give our order to you.

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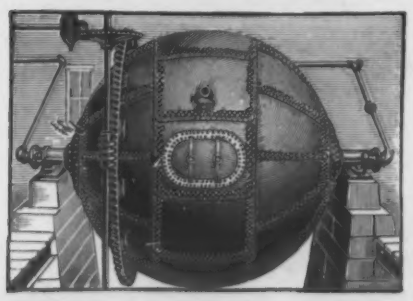

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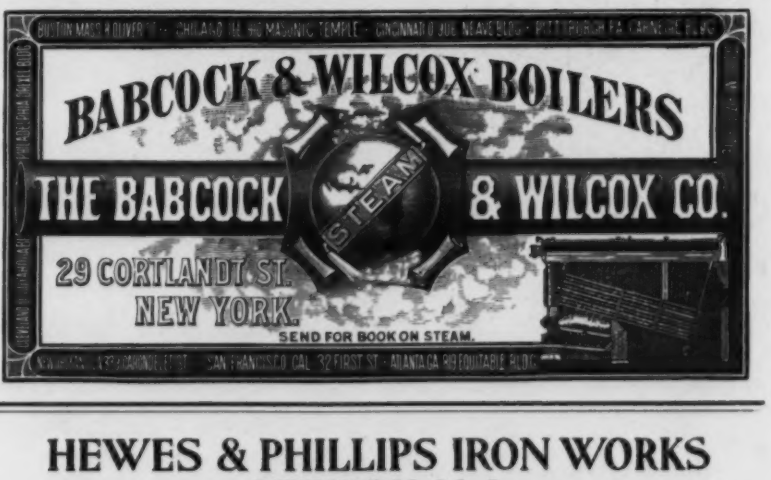

HEWES & PHILLIPS IRON WORKS

NEWARK, N. J.

IMPROVED, PATENT DOUBLE PORT CORLISS ENGINES

SIMPLE, COMPOUND AND TRIPLE EXPANSION

HORIZONTAL AND VERTICAL BOILERS

COMPLETE MOTIVE POWER PLANTS A SPECIALTY.

WHEN YOU ARE OFFERED

JENKINS or JENKINS BROS.' DISCS

that have trade mark same as cut, they are all right for high pressure steam. All others are imitations and you cannot hold us responsible. If you cannot get our Discs from your dealer, send to us for them.

JENKINS' BROS., 71 John St., NEW YORK.

31 North Canal St., CHICAGO. 117 North 4th St., PHILADELPHIA. 17 Pearl St., BOSTON.

ALUM!

THE MERRIMAC POROUS ALUM is unsurpassed for **purity** and good results.
All other grades of Alum for paper makers' use and for filtering purposes. Address

MERRIMAC CHEMICAL CO., 13 Pearl Street, Boston.

Imports and Exports.

IMPORTS AT NEW YORK.

FOR THE WEEK ENDED OCTOBER 8, 1897.

Alum	4	$58
Aluminous Cake	....	.....
Aniline Colors	591	43,705
Bleaching Powders	580	8,896
Books	317	32,193
Clay	....	543
Engravings	37	3,550
Jute Butts, etc.	....	.....
Newspapers	173	7,506
Paper	906	33,981
Paper Hangings	9	778
Paper Stock	3,831	28,069
Printed Matter	153	13,934
Soda Ash	2,606	5,623
Soda Caustic	156	1,898
Soda Sal	560	1,014
Soda Hypo	....	.....
Talc	....	.....
Terra Alba	....	.....
Ultramarine	....	.....
Waste	....	.....
Wood Pulp	52	553
Totals	9,975	$182,307
Imports General Merchandise for the week ended October 8, 1897	.....	$4,456,466

IMPORTS OF PAPER STOCK AT NEW YORK.

FROM JANUARY 1 TO OCTOBER 13, 1897.

Whence Imported.	Rags.	Old Papers.	Chemical Fibre.	Manilla Stock.	
	Bales.	Bales.	Tons.	Bales.	Coils.
Antwerp	10,034	56	510	13,493	229
Amsterdam	483	....	....	268	....
Barcelona	....	....	....	673	....
Bordeaux	2,791	....	....	....	....
Bremen	2,914	....	....	4,950	....
Bristol	....	....	....	2,467	1,786
Buenos Ayres	45	....	....	....	....
Calais	143	....	....	....	....
Calcutta	....	....	....	10,370	595
Catania	100	....	....	....	....
Christiania	413	....	155	1,436	....
Colon	75	....	....	....	....
Copenhagen	867	....	145	800	....
Dublin	42	....	....	....	....
Dundee	....	....	....	3,737	339
Genoa	537	174	....	4,326	....
Glasgow	128	898	....	1,052	....
Gothenburg	432	....	48	647	....
Hamburg	7,619	276	120	5,517	....
Havre	109	....	....	1,191	....
Hull	7,129	262	320	6,792	2,878
Kobe	5,365	....	....	....	....
Leghorn	3,496	....	....	686	....
Leith	32	....	145	126	239
Lisbon	53	....	....	....	....
Liverpool	1,310	192	....	4,801	1,966
London	7,334	2,151	....	6,235	917
Maracaibo	....	....	....	85	....
Marseilles	335	....	....	353	90
Newcastle	24	....	25	1,333	878
Rotterdam	4,953	....	....	2,610	123
Stettin	7,234	....	79	445	....

NEW YORK IMPORTS.

FROM OCTOBER 6 TO OCTOBER 13, 1897.

Train, Smith & Co., Friesland, Antwerp, 156 bs. rags.
J. W. Hampton, Jr., & Co., British Queen, Antwerp, 250 bs. bagging.
Train, Smith & Co., Kensington, Antwerp, 43 bs. rags.
James Pirnie, by same, 153 bs. bagging.
Train, Smith & Co., Panama, Bordeaux, 359 bs. rags.
Jessup & Moore Paper Company, Hekla, Copenhagen, 27 bs. rope, 267 bs. rags.
F. Bertuch & Co., by same, 40 ts. chemical fibre.
J. Libmann & Co., Critic, Dundee, 48 bs. manillas.
O. G. Hempstead & Co., by same, 73 bs. manillas.
J. B. Small & Co., by same, 183 bs. manillas.
F. Solomon & Co., Lady Blessington, Gothenberg, 240 bs. rags.
F. Salomon & Co., Prussia, Hamburg, 118 bs. rope.
F. Bertuch & Co., Colorado, Hull, 15 ts. chemical fibre.
Train, Smith & Co., by same, 93 bs. bagging.
Train, Smith & Co., by same, 62 bs. rags.
J. W. Mason & Co., Nomadic, Liverpool, 75 bs. rope.
R. Franklin, Europe, London, 51 bs. rope.
George Stratford, by same, 76 bs. rope.
J. W. Mason & Co., Megantic, London, 143 bs. rope.
J. B. Small & Co., by same, 51 bs. rags.
George Stratford, Manitoba, London, 54 bs. rope.

Paper.

Kupfer Brothers, Teutonic, Liverpool, 7 cs.
W. H. S. Lloyd, by same, 6 cs. hangings.
J. D. Wilson, by same, 1 cs.
Adolph Kraut, Prussia, Hamburg, 3 cs.
Hug & Boskowitz, by same, 2 cs.
S. A. Borgemann, by same, 4 cs.
Hardt & Lindgens, by same, 1 cs.
Dingelstedt & Co., by same, 2 cs.
Henry Lindenmeyr & Sons, by same, 7 cs.
G. W. Sheldon & Co., Patria, Marseilles, 6 cs.
William Wicke & Co., by same, 2 cs.
American Tobacco Company, La Bretagne, Havre, 64 cs.
Dingelstedt & Co., by same, 13 cs.
George E. Evans, by same, 10 cs.
Eagle Paper Company, Maasdam, Rotterdam, 29 cs.
J. Dickinson & Co., by same, 9 cs.
Dennison Manufacturing Company, by same, 18 cs.
Henry Lips, Panama, Bordeaux, 41 cs.
G. W. Sheldon & Co., by same, 51 bales.
Kupfer Brothers, Kensington, Antwerp, 15 cs.
L. C. Wagner, by same, 7 cs.
J. W. Hampton, Jr., & Co., by same, 20 cs.
W. F. Downing & Co., by same, 56 cs.
Paul Ruttmann, by same, 15 cs.
G. Gennert, by same, 25 cs.

Bleaching Powder.

F. A. Reichard, Friesland, Antwerp, 126 cks.
Fuerst Brothers & Co., by same, 51 cks.
J. L. & D. S. Riker, Cevic, Liverpool, 85 cks.
F. A. Reichard, Burgundia, Marseilles, 110 cks.

Soda Ash.

J. L. & D. S. Riker, Cevic, Liverpool, 14 cks.
Wing & Evans, by same, 1,200 bags.

BOSTON IMPORTS.

FROM OCTOBER 7 TO OCTOBER 13, 1897, INCLUSIVE.

Paper, Etc.

Oliver Ditson Company, Catalonia, Liverpool, 2 cs. printed music.
W. H. Guild & Co., by same, 6 bs. periodicals.
Dennison Manufacturing Company, Sagamore, Liverpool, 9 bs. tissue paper.
J. Atkins & Co., Virginian, Liverpool, 89 cs. paper.
Wadsworth, Howland & Co., Barrowmore, London, 1 cs. stationery.
Hooper, Lewis & Co., by same, 3 cs. stationery.
A. P. Schmidt, Hispania, Hamburg, 5 cs. printed music.

Paper Stock.

Train, Smith & Co., Hibernian, Glasgow, 83 bs. rags.
W. F. Crane, by same, 61 bs. rags.
E. Butterworth & Co., Sagamore, Liverpool, 89 coils manillas.
Horace Dutton & Co., by same, 286 coils, 14 bs. manillas.
E. Butterworth & Co., Michigan, Liverpool, 20 bs. rags, 99 bs. waste paper.
E. P. True, by same, 69 bs. waste paper.
Horace Dutton & Co., Canada, Liverpool, 48 coils manillas.
Train, Smith & Co., Philadelphian, Liverpool, 175 bs. rags.
E. Butterworth & Co., Armenian, Liverpool, 86 bs. rags.
Train, Smith & Co., Virginian, London, 408 bs. rags, 88 bs. waste paper.
The George W. Wheelwright Paper Company, by same, 244 bs. waste paper.
E. P. True, Hispania, Hamburg, 16 bs. rags.
Order, Barrowmore, London, 121 bs. rags.

Sizing.

Train, Smith & Co., Armenian, Liverpool, 55 bags.
E. Butterworth & Co., by same, 654 bags.
Thomas Groom & Co., Catalonia, Liverpool, 80 bags.
Baeder, Adamson & Co., Sagamore, Liverpool, 506 bags.
Warren & Co., Michigan, Liverpool, 160 bags.
E. Butterworth & Co., Philadelphian, Liverpool, 105 bags.
W. F. Corne, by same, 75 bags.

Bleaching Powder.

J. L. & D. S. Riker, Sagamore, Liverpool, 171 cks.
J. L. & D. S. Riker, Michigan, Liverpool, 342 cks.
J. L. & D. S. Riker, Canada, Liverpool, 257 cks.
Jerome Marble, Philadelphian, Liverpool, 42 cks.
J. L. & D. S. Riker, by same, 50 cks.
J. L. & D. S. Riker, Armenian, Liverpool, 146 cks.

Soda Ash.

Linder & Meyer, Sagamore, Liverpool, 13 tcs., 80 bags.
Churchman & Co., by same, 13 cks.
Warren & Co., by same, 62 cks.
Churchman & Co., Michigan, Liverpool, 20 cks.
Warren & Co., by same, 68 cks.
Jerome Marble, Philadelphia, Liverpool, 31 cks.
Linder & Meyer, by same, 800 bags, 32 tcs.
Linder & Meyer, Armenian, Liverpool, 25 cks., 27 tcs.

Caustic Soda.

Edward Hill's Sons & Co., Sagamore, Liverpool, 50 drums.

Soda Crystals.

Jerome Marble, Philadelphian, Liverpool, 150 bags, 56 cks.

Alkali.

Jerome Marble, Philadelphian, Liverpool, 120 bags.

Crude Sulphur.

Linder & Meyer, Philadelphian, Liverpool, 1,336 bags.
Linder & Meyer, Armenian, Liverpool, 1,337 bags.

PHILADELPHIA IMPORTS.

FOR THE WEEK ENDED OCTOBER 9, 1897.

Bleaching Powder.

Brown Brothers & Co., Pennsylvania, Antwerp, 160 bbls.
Order, Indiana, Liverpool, 41 cks.

Paper.

A. Hartung & Co., Scotia, Hamburg, 26 cs.

Soda Ash.

Brown Brothers & Co., Indiana, Liverpool, 50 bags.

EXPORTS FROM NEW YORK.

FROM OCTOBER 5 TO OCTOBER 12, 1897.

ALBUMS, cases, 1, $28.

ALUM, kegs, to United States of Colombia, 10, $24.

BOOKS, to Brazil, 10 cs.; British Australasia, 5 cs.; British Honduras, 1 cs.; British West Indies, 1 cs.; Central America, 4 pkgs.; Chili, 2 cs.; Hamburg, 2 cs.; Havre, 4 cs.; Liverpool, 4 pkgs.; London, 22 pkgs.; Mexico, 1 cs.; Naples, 1 cs.; Newfoundland, 2 cs.; Nova Scotia, 1 cs.; Southampton, 3 pkgs.; United States of Colombia, 20 cs.; Venezuela, 4 cs. Totals—54 cs., $2,301; 33 pkgs., $2,085.

CAUSTIC SODA, drums, to Cuba, 11; Venezuela, 10. Totals—21 ds., $271.

CLAY, bags, to Trieste, 560, $1,800.

COTTON WASTE, bales, to Hamburg, 278; San Domingo, 6. Totals—284 bs., $5,023.

LABELS, cases, to British West Indies, 1; Hamburg, 2; Liverpool, 1; London, 2; Newfoundland, 1; Rotterdam, 1. Totals—8 cs., $222.

MAPS, cases, to United States of Colombia, 1, $28.

MUSIC, to Central America, 1 cs.; Dutch West Indies, 1 pkg. Totals—1 cs., $23; 1 pkg., $10.

NEWSPAPERS, bales, to Manchester, 69, $511.

PAPER, to Aberdeen, 54 pkgs.; Antwerp, 25 pkgs.; Brazil, 101 pkgs.; British Australasia, 937 pkgs.; British Honduras, 73 pkgs.; British West Indies, 208 pkgs.; Central America, 25 pkgs.; Chili, 2 pkgs.; Cuba, 32 pkgs.; Dutch West Indies, 17 pkgs.; Hamburg, 12 pkgs.; Liverpool, 239 pkgs.; London, 4,375 pkgs.; Newfoundland, 61 pkgs.; San Domingo, 2 pkgs.; Southampton, 1 pkg.; United States of Colombia, 14 pkgs.; Venezuela, 87 cs. Totals—6,178 pkgs., $31,673; 87 cs., $736.

PAPER BAGS, to Brazil, 14 bs.; British Australasia, 29 bdls.; British West Indies, 8 bdls.; Central America, 1 bl.; Chili, 13 bs.; Cuba, 14 pkgs.; Mexico, 2 bdls.; Newfoundland, 26 bdls. Totals—65 bdls., $480; 28 bs., $279; 14 pkgs., $35.

PAPER BOXES, to Cuba, 1 cs.; Esbjerg, 22 bxs.; Liverpool, 17 bxs.; London, 6 cs. Totals—39 bxs., $728; 7 cs., $145.

PERIODICALS, packages, to London, 3, $82.

PHOTOGRAPHS, packages, to Havre, 1, $10.

PICTURES (other than oil), to British West Indies, 1 cs.; Hamburg, 1 pkg.; Liverpool, 7 pkgs.; London, 1 cs.; United States of Colombia, 1 cs.; Venezuela, 5 cs. Totals—8 pkgs., $364; 8 cs., $180.

PLAYING CARDS, cases, to British Australasia, 4; Central America, 1; London, 3. Totals—8 cs., $407.

PRINTED MATTER, to Amsterdam, 2 cs.; Antwerp, 1 cs.; British West Indies, 2 pkgs.; Hamburg, 3 pkgs.; Havre, 2 cs.; Leipsic, 1 pkg.; Liverpool, 34 pkgs.; London, 76 pkgs.; Mexico, 2 cs.; New Zealand, 2 cs.; Rotterdam, 2 pkgs.; Southampton, 15 pkgs.; Venezuela, 4 cs. Totals—133 pkgs., $6,010; 13 cs., $607.

ROSIN, barrels, to Brazil, 2,180; British Australasia, 100; Chili, 601; Genoa, 20; Hayti, 201; Peru, 250; United States of Colombia, 120; Venezuela, 135. Totals—3,627 bbls., $11,123.

SANDPAPER, to Antwerp, 10 cs.; Brazil, 1 cs.; British Australasia, 8 bdls.; Cuba, 3 bdls.; Darmstadt, 8 bdls.; Dinton, 16 pkgs.; London, 78 bdls.; Olton, 1 cs.; Peru, 5 bs., 1 cs.; Rotterdam, 50 cs.; Venezuela, 2 bs. Totals—97 bdls., $1,241; 16 pkgs., $537; 63 cs., $352; 7 bs., $89.

SODA ASH, kegs, to Peru, 10, $16.

STATIONERY, to Brazil, 7 cs.; British Africa, 5 cs.; British Australasia, 14 cs.; British Honduras, 8 pkgs.; British West Indies, 15 pkgs.; Central America, 9 pkgs.; Chili, 11 pkgs.; Cuba, 12 cs.; Hamburg, 2 cs.; Hayti, 1 cs.; London, 41 pkgs., 20 cs.; Mexico, 3 cs.; New Brunswick, 1 pkg.; Newfoundland, 7 cs.; Nova Scotia, 30 cs.; United States of Colombia, 2 cs.; Venezuela, 18 cs. Totals—121 cs., $5,909; 85 pkgs., $5,343.

TALC, bags, to Antwerp, 800, $575.

TWINE, to Argentine Republic, 48 bs.; Brazil, 31 bbls., 38 bs., 7 cs.; British West Indies, 5 pkgs.; Central America, 3 bs.; Dutch West Indies, 1 bl.; Peru, 5 bs.; United States of Colombia, 1 bl.; Uruguay, 470 bs.; Venezuela, 17 bs. Totals—1,367 bs., $4,056; 31 bbls., $636; 7 cs., $413; 5 pkgs., $89.

WALL PAPER, to Central America, 11 bdls.; Dutch West Indies, 1 cs. Totals—11 bdls., $70; 1 cs., $27.

WASTE, bales, to Venezuela, 9, $70.

WOOD PULP, rolls, to Gothenburg, 178; Hamburg, 194. Totals—372 rls., $1,075.

Total exports for the week, $6,474,588.

Mortgages, Etc.

[In the appended list R. signifies a renewal of a pre-existing mortgage; B. S., bill of sale; T. D., trust deed; T., trust mortgage; F., foreclosure; Real, a mortgage on real estate; C., conveyance realty; Pr., printer; P., publisher; W. P., wall paper; M., music.]

EASTERN STATES.

Mortgagor.	*Amount.*
Charles A. F. Emery (Pr.), Boston, Mass..	$1,000
James E. Smith (W. P.), Worcester, Mass..	1,200

MIDDLE STATES.

Ideal Paper Box Co., Brooklyn, N. Y.....	480
Frank E. Stevens (M.), Brooklyn, N. Y. (B. S.)	728
John Buckbee (W. P.), Elmira, N. Y. (Real)	1,700

SOUTHERN STATES.

R. A. Burleson & Co. (B. & S.), Waco, Tex. (T. D.)	—

WESTERN STATES.

J. K. Cooper & Co. (B. & S.), San Francisco, Cal., J. K. Cooper, two-thirds interest (B. S.)	—
Temple Press Society, Denver, Col.	983
D. E. Donley (Pr.), Alexis, Ill.	268
T. D. Shoupe (P.), Carlyle, Ill.	700
George J. Knott (Pr.), Chicago, Ill.	990
Register, East Dubuque, Ill.	100
Daily Mail Publishing Co., Galesburg, Ill...	1,500
William Halley (P.), Oak Park, Ill. (B. S.)	1
William B. Knopf (Pr.), Pontiac, Ill. (B. S.)	—
Benham Bros. (Prs.), Anderson, Ind.	435
George M. Myers (Pr.), Belle Plaine, Ia....	228
Curtis J. Barnett (P.), Dexter, Ia.	450
John A. Kyle (P.), Lake Mills, Ia.	450
Mattie Bishop et al.(P.), Junction City, Kan.	420
Stanton Printing Co., Grand Rapids, Mich. (R.)	2,000
Charles F. Ellis (P.), Austin, Minn. (2)....	1,400
Louis J. Bach & Vertifenille (P.), St. Paul, Minn.	300
J. H. Jacobs (P.), Narborne, Mo.	275
Lacy & Kratz (Prs.), Cincinnati, Ohio.....	100
H. L. Milgate (Pr.), Cleveland, Ohio	107
Berlin Printing Co., Columbus, Ohio (R.).	1,400
H. K. & E. G. Finch (P.), Portland, Ore..	543
J. W. Singletary (B. & S.), Portland, Ore. (Real)	1,400
J. M. Miles (P.), Redfield, S. Dak.	175
Charles H. Englesby (P.), Watertown, S. Dak.	150
J. F. Boyd (M.), Marinette, Wis. (B. S.)..	425
Frederick Pollworth & Co. (Prs.), Milwaukee, Wis.	3,000
Samuel P. Ford (Pr.), Milwaukee, Wis.	478

CANADA.

Rossland Miner Printing and Publishing Co., Rossland, B. C.	2,500

LIENS DISCHARGED.

W. C. Markham (Pr.), Baldwin, Kan.	868
Belle & Clevenger (Prs.), Osawatomie, Kan.	180
Post Printing Co., Worcester, Mass.	5,000
Robert Wright (P.), Munising, Mich.	256
Charles H. Englesby (P.), Watertown, S. Dak.	200

JUDGMENTS.

Le Canadien Publishing Co., St. Paul, Minn.	103
Volkzeitung Printing and Publishing Co., St. Paul, Minn.	107
Robert H. Merriam (P.), New York, N. Y. (2)	1,907.40
Charles Barsotti (P.), New York, N. Y...	590.20
University Press, New York, N. Y.	930.80

The *Press* Publishing Company, Limited, York, Pa., has been incorporated and has purchased the *Evening Age* and *Weekly Democratic Press*, of the city named. The company will begin the publication of the *Evening Press*.

EDWIN BUTTERWORTH & CO.,
MANCHESTER, ENGLAND,
PACKERS OF ALL KINDS OF
Paper Stock, Cotton Waste and Buffalo Sizing, Wood Pulp, Moist and Air Dry Pulp, Soda and Ground Pulp,
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JAMES PIRNIE, A. S. DEMAREST, } Managers.
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WATERBURY
Felts and Jackets
MANUFACTURED BY
H. WATERBURY & SONS CO.,
ORISKANY, N. Y.
Adapted to *every* grade of paper from the *finest* to the *coarsest*.
The Largest Manufacturers of Paper Makers' Felts in the World.
Our wet machine or pulp felts are *unequaled* for *durability*.
For WRITING and LEDGER PAPERS
We warrant a felt equal to anything imported.

QUIMBY SCREW PUMPS.
Pressure Pumps
FOR WOOD PULP GRINDERS.
SEND FOR ILLUSTRATED CATALOGUE TO
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TRAIN, SMITH & CO.,
IMPORTERS OF AND DEALERS IN ALL DESCRIPTIONS OF
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WHOLESALE DEALERS IN AND PACKERS OF
Woolen Rags and Paper Makers' Supplies,
A STREET, SOUTH BOSTON, MASS.
WOOLEN RAGS GRADED IN COLORS AND QUALITY.
OUR SPECIALTIES: "EXCELSIOR" AND "STAR" PACKINGS.

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JOSEPH PORRITT & SONS'
TRADE MARK.
ENGLISH FELTINGS.
ALSO IMPORTERS AND DEALERS IN
MARINE BLUE (Aniline) for News Paper Mills,
Jacketing, Roll Cloth, Double Extra Canvas, Ultramarine Blue.

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7 Exchange Place, Boston. Long Distance Telephone 2312 Boston.
EXPERT IN THE SULPHITE PROCESS AND ALL CHEMICAL MATTERS PERTAINING TO THE MANUFACTURE OF PULP AND PAPER.

COCHRANE CHEMICAL CO.,
55 Kilby Street,
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Manufacturers of Alum.
Highest tests, free from iron, and all other grades used by paper makers.
Also manufacturers of ACETIC ACID, SULPHURIC ACID and other chemicals.

S. J. ROSE,
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....Importer of Linen and Cotton Rags, Hemp and Jute Bagging.
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A. WERTHEIM & CO., HAMBURG, GERMANY.
Exporters of All Grades of Sulphite and Soda Pulps.
SIGMUND GOLDMAN, Agent for the United States and Canada,
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THE "DRAPER" FELT
MANUFACTURED BY
DRAPER BROS. CO.,
CANTON, MASS.
WE SOLICIT ORDERS FOR Press and Pulp, Cylinder, Fourdrinier FELTS.
SATISFACTION GUARANTEED.

Our Fibre is made especially for
... BOOK PAPER MANUFACTURERS.
For a good, clean and strong
UNBLEACHED SULPHITE FIBRE
Write for prices and samples to the
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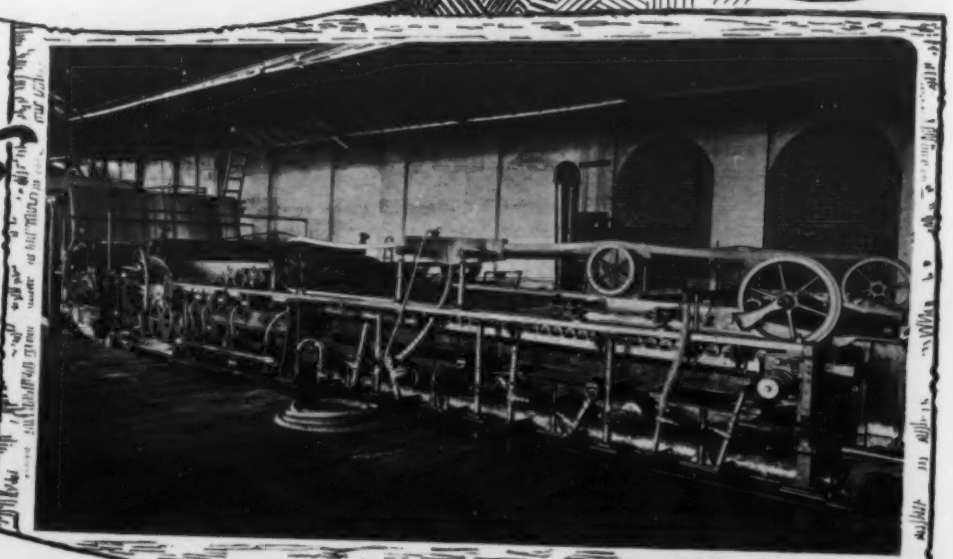
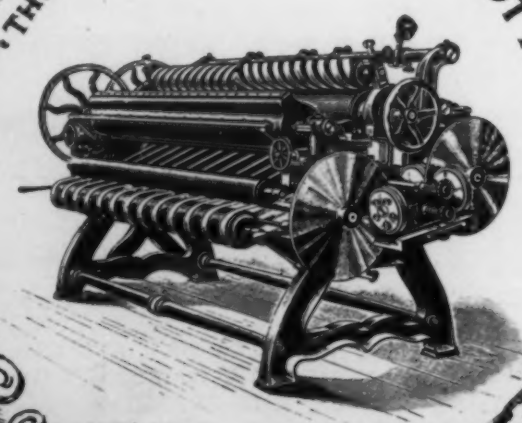
LAWRENCE MASS.

MANUFACTURERS OF
PAPER-MILL-MACHINERY
FOURDRINIER, CYLINDER AND WET MACHINES.



"THE HORNE" FRICTION CUTTER.
PAT. December 13, 1892.



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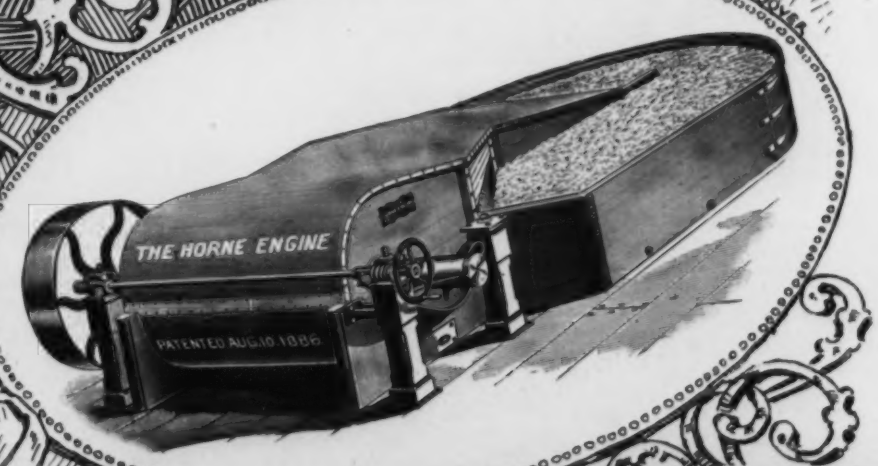
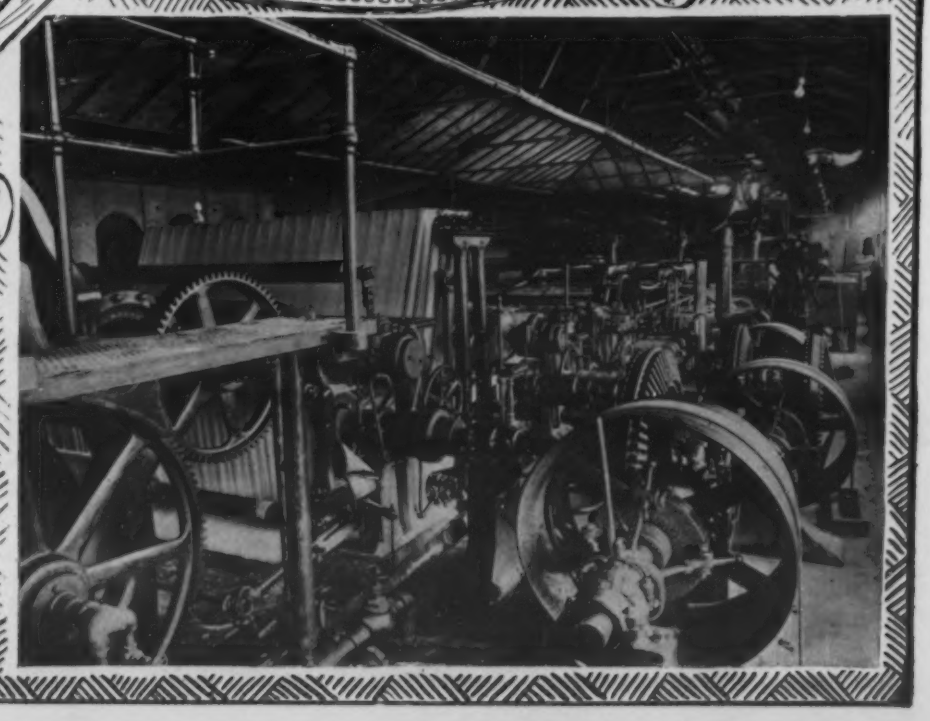
8 inch Outlet
400 Revolutions

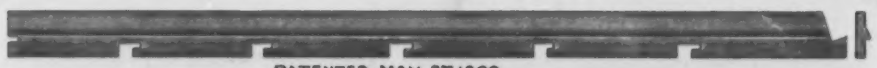
LARGEST CAPACITY JORDAN ENGINE
25 Tons Capacity News in 24 hours
Water Cooling Bearings
Long Shaft and Outside Bearings

Roll-Bars. Bed-Plates and Knives of all Kinds

G. E. HUSSEY, ANDOVER







PATENTED MAY 27, 1890.

BARBED JORDAN BAR

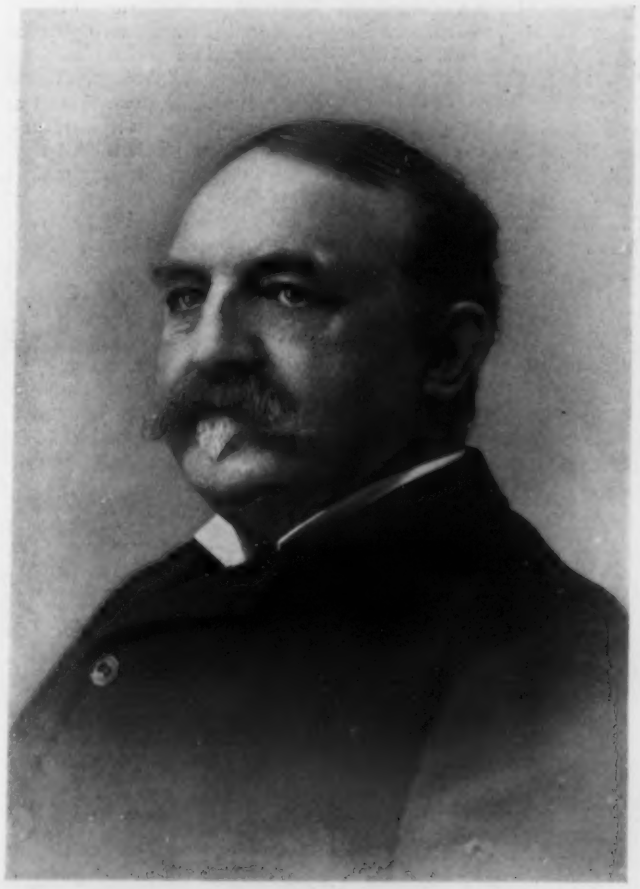
MANUFACTURE OF TISSUE.

REMINISCENCES OF A WELL-KNOWN PAPER MAKER.

The Hop Brook Mill—The "Water Shops" Mill—The Ames Family—Loading Paper with Gypsum—The Laflins—How to Wake a Back Tender—The Tissue Paper Business.

By Col. GEORGE W. THOMPSON.

N compliance with the request of the editor of The Journal to give some of my experiences in manufacturing tissues and other papers from early days to the present, I will say that my first knowledge of this art was acquired while an apprentice to Messrs. Platner & Smith, of Lee, Mass. This was about 1846. This firm at that time stood rather at the head of the fine letter paper manufacturing. Their mills were located in Lee and Tyringham, Mass.; the latter was known as Hopbrook Mill, and it was at that mill that I was first employed. George West, the present millionaire paper maker, was also employed there as a machine tender, but soon left to take charge of a mill somewhere in New England, I think. I remained at this mill about



G. W. Thompson.

six months and then went to the Huddle Mills in Lee, owned by the same firm. At these mills I served the balance of my apprenticeship, three years in all; I was then about nineteen years old and a journeyman.

I then went to the "Water Shops" Mills, near Springfield, Mass., owned and run by Messrs. D. & J. Ames. The Ameses were at one time about the oldest and largest manufacturers of paper in the country. The father of David and John was well known as "Pa Ames," and had been a very successful manufacturer, having mills at Chicopee and Springfield. The younger Ameses, David and John, had allowed the quality of their goods to run down and were slowly rusting out when I went with them. I remember the way they had of adding weight was from an old gypsum mine near the mill; this they mined and crushed with a crude grinder, and after screening a little, wheeled it to the side of the beaters and shovelled in all they thought the stuff would carry. One of the effects of this kind of pulp was to make the paper quite gritty, almost like very fine sandpaper. The old cylinder machine with one large fire dryer was run about twelve hours per day, and during this time the gypsum would accumulate on the dryer so thick that very little heat could get through it. A good strong steel scraper was then employed to clean it and the machine was ready to go ahead again. This would be considered rather rough paper making in these days. It is needless to say that after a few years of this kind of paper making the company stopped. John Ames was something of a mechanical genius, and among other things he claimed to have invented was the cylinder machine. Other mills put in their machines and a long litigation followed, many combining to fight the patent, and I believe Ames was finally beaten.

At the time I was at this mill "Joe" Carew was running his mill across the river, opposite the present Holyoke Mills, and his was the only mill in that section. Holyoke, as I recollect it, was a plain of sand with hardly a house to be seen. Things have changed in that section. I remained at the Ames mill about six months, and then had a call from Laflin Brothers, in Herkimer, N. Y. This was a new mill built by the Laflins and equipped with the best paper machinery then known. The machine was a Fourdrinier, and built by, I think, Smith & Winchester, Connecticut. We made on this machine the first "laid" papers ever made in this country, the dandy roll having been imported from England expressly for us. We also imported the first plating calenders used in this country, and made the finest grade of writing and ledger papers, finishing them in the style to imitate the celebrated Kent Mills paper of England.

The Laflins ran the mill from about 1847 to 1857, when they sold out to a stock company organized by Richard Bainbridge and Bangs, of Bangs Brothers & Co., publishers, New York.

I was appointed manager of the mills and given a fair lump of the stock, but the panic of '57 broke up the principal stockholders before they had paid up in full for their shares. The result was the company had to stop, and the mill went back into the hands of the Laflins, who held quite a large mortgage on the premises.

A little incident connected with this mill occurs to me just now. My old friend George Knowlton, who has since become a very prosperous manufacturer in Watertown, got his first knowledge there of fine-paper making. His father had a small and rather ancient mill in Watertown. George discovered that this mill was not quite up to date, and being ambitious to know more of the business than he could learn there came to the Herkimer Mill, and was first given a position as back tender on the Fourdrinier machine. This machine ran twenty-four hours. The change of tours occurred at 12 o'clock at night. George boarded at some distance from the mill, and the boy whose tour expired at midnight had to call him, but it required so much pounding to wake him that the other sleepers in the house protested. Young George's ingenuity here came to his rescue, and he tied a string to his big toe and hung the loose end out of the window for the other boy to pull gently and wake him without disturbing the house. This worked first rate for some time, and until the village boys "got on to it." One night his slumbers were fearfully disturbed, and he was pulled nearly out of the window. It is hardly necessary to say that after this the string plan was abandoned.

This mill changed hands several times in a few years and finally burned down. I think the 62-inch Fourdrinier machine was sold to Brown & Weston, of Dalton, and is still one of the machines on which Byron Weston makes his superior ledger papers. A new mill was built on the premises by Warner Miller and is still run by him on news paper.

After the war ended I went into partnership with Murray Crane (an uncle of the present Lieutenant-Governor of Massachusetts), at Ballston. We made papers for paper collars and put in machinery and made the collars. This was a success. The mill had previously made white tissue, and it was about the first mill that ran on that class of papers in this country. It was not a success. I organized the Diamond Mills Paper Company about 1875, and rented a mill in Milburn of the late I. D. Condit. We made first the Gayety medicated papers and other tissues. The only other mills that made tissues that I know of at that time were the Rainbow Mills in Connecticut, run by Hodge, and a mill in Holyoke, run by Frink. A sheet weighing 7 pounds to the ream, 20 x 30, was about as thin as any mill in this country could make. Many mills now run down to 3½ pounds and even 3 pounds. We made in this Milburn mill the first successful grass-bleached tissue for wrapping silverware made in this country. We purchased the mill about 1875, and have rebuilt and enlarged it and put in an 86-inch Fourdrinier machine.

H. V. Butler, of Paterson, put his Ivanhoe Mill on tissues about this time and made an excellent quality of copying paper—the first I think made in this country. This mill ran successfully on copying and other papers for several years, but is now abandoned and the machinery taken out.

The Diamond Mills Paper Company ran the Whippany Mill several years on fine copying and other tissues, but abandoned it about four years ago and removed the machinery to its Milburn mill. The company purchased the Silver Spring Mill, in Bloomfield, N. J., and made there a great variety of tissues, including nearly all the papers of this class heretofore imported.

The Smith Paper Company, of Lee, Mass., about four years since turned its mills on tissues and is a successful manufacturer of same.

There are in this country to-day about seventy-five mills making tissue. Most of these have been built and altered for running this class of paper since 1890.

Notes as to Some Tennessee Mills.

There are records of four mills operated in Tennessee in the year 1810. About that time the General Assembly of the State was earnestly desirous of encouraging the manufacture of paper within its borders. To further this purpose two statutes were enacted, one to exempt paper workmen from military duty, and the other to authorize any manufacturer of paper in Tennessee to collect rags without a tax. The first of these statutes, which was passed by the legislature on November 13, 1809, is as follows:

"Whereas, it is considered by the present legislature that an increase of the home manufacture will promote the independence of our rising State: Therefore, Be it enacted by the General Assembly of the State of Tennessee that from and after the passage of this act all persons immediately in the employment of the manufacture of paper in any of the paper mills erected in this State, or that may be employed in any mill that may hereafter be erected, that they be and are hereby exempt from working on roads or highways or from attending musters in the companies, regiments or battalions to which they belong; provided that in all calls for militia they shall be subject in the same manner as they would have been had this act never been passed."

The second statute, which went into effect on November 23, 1811, or two years subsequent to the first act, reads as follows:

"To encourage the manufacture of paper: Be it enacted, etc., That all persons who are owners of paper, or shall hereafter be, shall be allowed to employ some person to peddle and merchandise rags without paying tax, provided nothing herein contained shall authorize those persons to take or receive any money or articles for said goods but rags."

In 1835 McEwin, Morrison & Hays built a paper mill at Nashville. Two years later a quarter interest in it was purchased by a Mr. Whitman, who assumed the management of the manufacturing department. This mill later passed into the hands of the Rock City Paper Manufacturing Company. On Duck River, about a mile from the town of Manchester, Whitman Brothers operated a paper mill for several years. Early in October, 1878, the mill was totally destroyed by fire. In 1837 on the Cumberland River, about a mile above Gallatin landing, Morris & Rogers built a paper mill. During 1839-40 Andrew Wallace had charge of the mill, but very little else is known as to it.

THE "LEFT-HAND" MAN.

THE WEAVING OF THE FIRST FOURDRINIER WIRE.

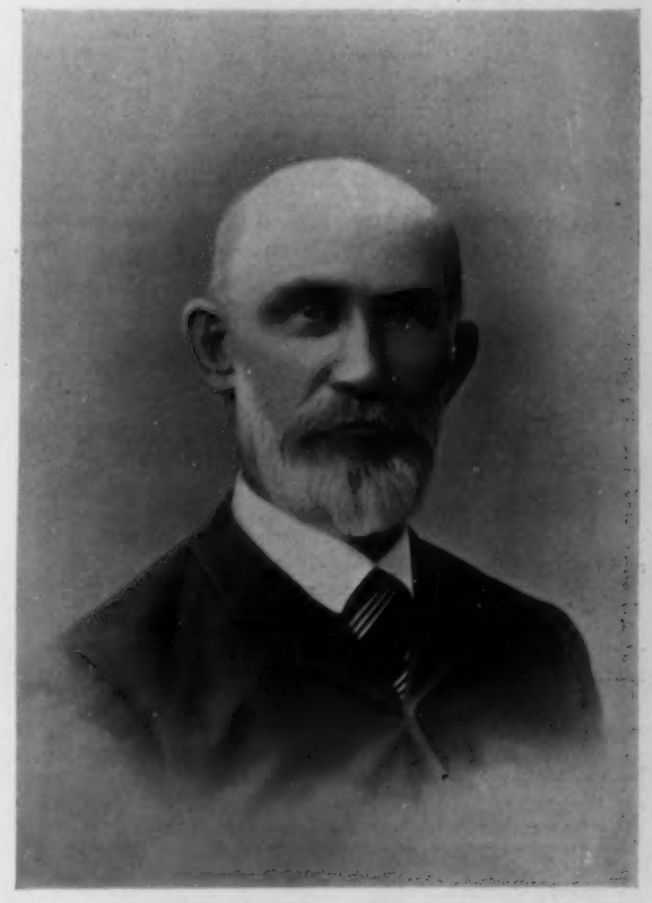
The Loom on Which the First Wire Was Made—The Size of the Wire and the Mill in Which It was Used—How the Sale of American Wires Was Stimulated—The First American Dandy Roll.

By CORNELIUS VAN HOUTEN.

N the spring of 1847 William Staniar came from England and brought to America a model for weaving Fourdrinier wires, he being then connected with William Stephens & Son, Belleville, N. J., in which firm he had an interest. From that model I made the first American loom for weaving Fourdrinier wire, and in September, 1847, Mr. Staniar and myself wove the first American-made wire, he being the "right-hand" and I the "left-hand" man on the loom.

That first wire was 62 inches by 24 feet 10 inches and was used in the mill of J. & R. Kingsland, at North Belleville (now Franklin), N. J.

It was very hard work to introduce the American wires. In



Cornelius Van Houten.

those days the machines were run in the main by Scotch and English tenders, and they all held the opinion that a satisfactory wire could not be made in America. There was a great prejudice against the new American wires, and the only way the American maker could sell his goods was by packing them in imported boxes. They however, steadily won their way, and to-day American wires are superior to those made by English, German or French makers.

In 1848 I made the first American dandy roll, but I cannot now remember what the design on it was, nor do I remember by whom it was used.

I have been continuously connected with the business since 1847, first as journeyman, afterward as superintendent and then as treasurer, which position I now occupy in the De Witt Wire Cloth Company, the successor of the original firm, which company was incorporated in 1876.

It is one of the pleasures of my life to reflect on the early struggles, the patience and perseverance required to overcome existing prejudices, which were followed by a complete triumph over all foreign competitors, and resulted in establishing a new and important American industry.

APPLETON NOTES.

Appleton, Wis., October 9, 1897.

The annual meeting of the Neenah and Menasha Water Power Company was held last week, the company having been organized just about a year ago. The reports of the various officers were very satisfactory in their nature, and it was shown that through the offices of this company much better water power had been maintained than during previous periods when water was drawn under individual responsibility. At the annual meeting the old officers were re-elected, and the board of directors was made up as follows: J. A. Kimberly, W. Z. Stuart, John McNaughton, C. R. Smith, and J. S. Gittens.

The foundations are all in for the new buildings required for the enlargement of the plant of the Riverside Fibre Company, and almost all of the machinery is ordered. It is expected that by the first of January the mill will be making from 30 to 35 tons of fibre a day. There will be a new wet machine room, 36x105 feet in size, which will contain sixteen new screens of ten plates each, and a new 84-inch wet machine. A new acid-plant building will also be constructed, 24x120 feet in size and four stories high. The wood-preparing machinery will also be added to.

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NEW YORK, SATURDAY, OCTOBER 16, 1897.

THE price per copy of this twenty-fifth anniversary number of THE PAPER TRADE JOURNAL is 25 cents, delivered at the office of publication, 30 cents postpaid in the United States and Canada, and 75 cents in foreign countries.

ON the opposite page is presented the table showing the capacity per day of paper and pulp mills in operation in the United States, the figures being arranged both by States and by grades.

AN idea of the amount of reading matter in this issue of THE JOURNAL may be had when the statement is made that if it was put in a book having the same size page as Lockwood's Directory it would make a volume of over 360 pages, just a few less than the number in Lockwood's Directory for this year.

THE statement on page 19 by William Buchanan, in his article on Fourdrinier wires, as to the longest wire is incorrect, and the sentence referring to it should be: "The longest wire of which I know is run by the Willamette Pulp and Paper Company, of Oregon City, Ore., it being 70 feet long and 84 inches wide." The article in question was printed when this correction by Mr. Buchanan was received. It will also be noted that Mr. Buchanan errs as to who made the first wire. The two men who did make it were William Staniar and Cornelius Van Houten, both of whom are living, and both of whom contribute in this issue their testimony as to the fact.

OUR SILVER ANNIVERSARY.

With this issue THE JOURNAL celebrates its silver anniversary. Twenty-five years ago it was established by the late Howard Lockwood, who conducted it up to the time of his death, five years ago.

The present issue is believed to be a fitting souvenir of the anniversary. It contains a review of the American paper trade, not only for the past twenty-five years, but back to the time when Rittenhouse erected the first American paper mill near Philadelphia in 1690. A member of the family, Dr. Rittenhouse, tells somewhat of the mill and of the Rittenhouse Memorial Association, while another descendant of the family, William H. Nixon, now the dean of the industry in the Quaker City, presents a résumé of the history of the trade in and about Philadelphia.

The development of the American paper machine is related by T. H. Savery, vice-president of the Pusey & Jones Company, who has seen it grow from a narrow, slow-speed device to its present mammoth proportions, with a speed of over 500 feet a minute.

The Hon. George A. Bagley, of the Bagley & Sewall Company, who built the first American pulp grinder from American patterns, touches upon the development of the pulp manufacturer's chief bit of equipment, and shows the changes which have been made in it.

Guyon Miller, of the Downingtown Manufacturing Company, who is exceedingly well up in the history of the beating engine, contributes an interesting tale of the evolution of the modern engine from the old-time stamper, and its successor, the Hollander.

The two men who wove the first American Fourdrinier wire, William Staniar, the "right-hand man," and Cornelius Van Houten, the "left-hand man," on the first loom, the latter having built the loom, tell, in a modest way, of the making of that wire, and of the difficulties they had in introducing the domestic article to manufacturers, while William Buchanan adds some information as to the changes which have taken place in the Fourdrinier wire business.

A. Pagenstecher, the president of the Hudson River Pulp and Paper Company, and of the Manufacturers Paper Company, and whose interests in the paper and pulp business, outside of these concerns, are large, contributes an entertaining story of the introduction of ground wood and of the Voelter machine to this country, he himself being the chief actor in establishing the industry here.

The Smith Paper Company, of Lee, Mass., was the first concern to use ground wood in paper manufacturing here, and the Hon. Wellington Smith, the president of that company, recites the story of its use, the article being accompanied by the invoice for the pulp, which was sold at 8 cents a pound.

The story of the making of the first American felt is related by D. M. Fuller, general superintendent of the Albany Felt Company, and a son of Andrew Fuller, who made the felt at Camden, Me.; a synopsis of the growth of the business being also added.

The history of the Willcox "Ivy" Mill, which was a factor in early American paper making, is by Joseph Willcox, it being accompanied by a picture of the mill as it appeared in 1865, and by an illustration of an old hand mould, made by Nathan Sellers. The mould is now in the possession of the Pennsylvania Historical Society, and the illustration is made possible by the courtesy of Horace W. Sellers.

The first American mould was made by Nathan Sellers, a descendant of whom, Horace W. Sellers, contributes a highly interesting narrative of the work of his ancestor, and of other members of the family, in connection with the paper industry.

The Gilpin Mill, on the Brandywine, was historic, and in 1851 Miss Elizabeth Montgomery, in a book entitled "Reminiscences of Wilmington," published a sketch of life on the Gilpin estate, the description of the mill and its equipment being furnished to her by Thomas Gilpin, who, in 1817, took out a patent for a cylinder machine. Miss Montgomery's story is herewith reprinted.

Hon. Arthur C. Hastings, mayor of Niagara Falls, and general manager of the Cliff Paper Company at that place, which company was the first to use electrical power in the running of its paper machines, gives his experience in that line.

Chester W. Lyman, the efficient secretary of the American Paper and Pulp Association, presents a history of the association. It is the best history of the body which has ever been written, and gives in excellent form strong reasons for the existence of the organization, by showing the important work which it has accomplished.

W. H. Parsons, Jr., an ex-secretary of the same association, and who is now largely interested in the exporting of paper, treats of that line of business, which is just now presenting such opportunities to American paper and pulp manufacturers.

Benjamin C. Tilghman, the discoverer of sulphite fibre, is represented by an article in which he rehearses how he came to make his discovery, while George N. Fletcher, who is president of the Rumford Falls Sulphite Company, and also director of the Rumford Falls Water Power Company, and who introduced the Mitscherlich process here, tells of the building and equipment of his own plant at Alpena, Mich., the first financially successful sulphite mill in the United States.

There is also told the story of the introduction of soda fibre here by Hugh Burgess, and the early beginnings of that industry at Gray's Ferry, accompanied by Mr. Burgess's story of his experiments in developing the fibre.

Ethan Allen Doty, whose father was the first American manufacturer of surface-coated papers, and who himself has spent a lifetime in the business, sets forth the history of that branch of the trade in a most complete way.

F. W. Leinbach, whose uncle made the first American machine-made paper bag, and who himself has been in that line since its early days, records the growth of paper-bag manufacturing, depicting the various progressive stages of the industry.

Thomas Duncan, the head of the Duncan Company, who has likewise other large paper-manufacturing interests, grows reminiscent, and, drawing from his experiences, shows how wood can be used in producing very superior results in the way of high-class book papers.

Charles D. Brown, the originator of the wood-pulp board, places before the reader the beginnings and the outreachings of that line of business, while Frank Whiteside, the well-known strawboard manufacturer, does the same for steam-dried strawboards.

The "slow-burning" principle of construction as applied to paper mills, which was worked out by Edward Atkinson, of Boston, is the subject upon which Fremont W. Spicer writes. Mr. Spicer has been the vice-president and general manager of the Frontenac Paper Company, whose mill—the first built upon the slow-burning principle—was erected under his direction; and has just resigned his position with that company to go abroad for the well-known New York paper house of Perkins, Goodwin & Co. Mr. Spicer, it will be remembered, was the gentleman selected by the American Paper Manufacturers' Association to accompany the delegation which went to South America under the auspices of the National Association of Manufacturers.

The progress of the paper trade in various sections is discussed by several writers. J. A. Kimberly, the leader of the largest interests in the Northwest, treats of the Fox River Valley; Oscar S. Greenleaf, president and treasurer of the Holyoke Paper Company, of Holyoke; A. H. Chatfield, of the Chatfield & Woods Company, of Cincinnati and vicinity; Col. J. C. Morgan, the general manager of the Niagara Falls Paper Company, of Niagara Falls; W. H. Nixon, of the Martin & W. H. Nixon Paper Company, of Philadelphia; J. W. Butler, of the J. W. Butler Paper Company, of Chicago; George W. Knowlton, of Knowlton Brothers and the Ontario Paper Company, of the Black River district, and Benjamin F. Reist, of the Miami Valley.

Col. G. W. Thompson, president of the Diamond Mills Paper Company, tells somewhat of the tissue-paper trade and draws from his fund of reminiscences, as does also Edward Conley, who has long been identified with the trade.

W. H. Eaton, of Eaton, Dikeman & Co., and who was for years connected with the mill which made the first American blotting, presents the facts as to that important branch of trade.

Henry Atterbury, of Atterbury Brothers and the Chelsea Paper Manufacturing Company, furnishes the recital of the course of the domestic and foreign rag business here.

Thomas Howard, who made both the first hand-made and the first machine-made paper in Utah, rehearses how he did it.

J. F. Hobart serves a collection of experiences in paper mills, George Damon Rice treats of some of the few uses to which paper and pulp have been put in other industries. H. H. Porter contributes an interesting story as to paper making in a well-known Connecticut mill before and during the war, while there are a number of miscellaneous articles concerning the history of the manufacturing trade in many States.

John D. Tompkins, of Brainard, who, together with his family in its many branches, has long been identified with the straw wrapping paper business, traces the history of that line in New York State, and does it in a very graphic manner.

THE ILLUSTRATIONS.

There are presented in this issue a number of illustrations, to which particular attention is directed. In the main they are portraits of men who have been the powers which have shaped and directed the American paper and pulp trade in one way or another. They are of inventors or discoverers, or of men who have been chiefs in the starting up of certain lines of industry in the American paper trade. Most of them are yet living and are yet in business harness, but some of them have joined the majority.

Besides the portraits there are illustrations of buildings, etc., which are historic. There are interiors and exteriors of the Sunnyside Mill, which, with its 36-inch cylinder, makes eighteen reams of tissue a day, and where the owner is a veritable Pooh-Bah, he filling all the positions in the establishment. Then there is the surveyors' plan of the Rittenhouse estate and a drawing of the site of the Rittenhouse mill. The mill at Camden, Me., where the first American-made paper makers' felt was produced, is shown, as is also an old print of the building where was fashioned the first machine-made American paper bag. The first mill built on the slow-burning principle, the first sulphite mill established here on a sound financial basis, the "Ivy" Mill and the Gilpin Mill, are all illustrated in these pages, and the last named is known to few, if any, of the paper trade. The reproduction is from an engraving by the celebrated American engraver, John Sartain, whose fame has spread wherever the impression of an engraved steel plate is known. The article by Mr. Doty is accompanied by a picture of the "Old Rigging House," in New York, where both American Methodism and the surface-coated paper business were born, and is from an old print, which, it is believed, is unique, and which is now in the possession of Mr. Doty's firm.

WATERMARKS.

BY DANDY.

So this is the silver anniversary of THE JOURNAL. Well, here's to it, and I drink the toast with a fizz—a silver fizz. There's no Klondike about this, even if the special number is a "Yeller."

When THE JOURNAL began its existence it was a plain ledger, in which were recorded the credits and debits of the various concerns in the trade. Then it was thought desirable to have it "watermarked," which desire accounts for my existence. Just what type of a "dandy" I am I can hardly say, but some people might be good enough to say that I was a revolver. However, be that as it may, THE JOURNAL has managed to live for twenty-five years, notwithstanding my weekly assaults on its life.

Dear me! Twenty-five years! A quarter of a century. What changes have taken place in that time! How the price of paper has shot the chutes, and how the price of rags, jute butts, soda fibre and almost everything else in the paper-supply line has kept it company. Of course there was a decided rise in prices along about 1880, but after that they went back to their old ways and went down hill again. Just whether they have reached the bottom of the hill and struck the level is an open question in some lines.

It was in the days when the dry-goods houses used to be large buyers of straw wrapping paper. One salesman was selling it to one well-known house at $5 a ream. Another salesman came along, said they were being robbed, and offered to sell at $2.50. The first salesman, when he next visited the buyer, had this story thrown at him, and at once advised the buyer to invest. After he left he arranged a scheme whereby his competitor was offered a particular lot of straw paper at a very low price. The competitor bit at the bait, secured the paper, and in turn sold it to the buyer referred to. The salesman who had been charging $5 shortly afterward visited the buyer and asked him if he had received his cheap paper. The buyer replied in the affirmative, and when asked if it was full count, said he did not know, but he would investigate. He did so, and it was found that the reams had been split in half, so that it was decidedly "short count." That was many years ago, but to this day those competitors do not speak as they pass by. The $5 salesman got his trade back.

There is told a story which has for its object the demonstration of the manner in which it was discovered that manilla rope could be used in the making of paper. The discoverer, so alleged, was a Jersey paper maker. He went away from home on a trip, and was returning by the then rapid transit, a canal boat. He wanted to chew, and finding much to his discomfort that he had not brought along a paper of his favorite brand, he cut off a bit of a manilla line and began to masticate it. As he was chewing this new-found cud, it occurred to him that the material would make good paper stock. He continued to use his mouth as a beating engine, and before he had reached the end of his journey he had determined to try the stock in his mills. He did, and the experiment was so successful that he installed manilla rope as one of his regular raw materials. The story may not be history, but it is entertaining anyway.

THE FIRST FOURDRINIER HERE.

IT WAS STARTED AT SAUGERTIES, N. Y., ON OCTOBER 24, 1827.

It Was Sixty Inches Wide and Was Built by Bryan Donkin, of London—The Men Who Worked on It—The Last of It Destroyed by Fire in 1872—The Second Machine—Other Early Fourdriniers.

THERE are several claims made as to where the first Fourdrinier machine in this country was located and who started it, but the facts seem to warrant the statement that it was located at Saugerties, N. Y., in a mill owned by Beach, Hommerken & Kearney, and that it was started by the late Peter Adams, the well-known paper maker, who founded the Peter Adams Company at Buckland, Conn., and the Adams & Bishop Company at Newburgh, N. Y. The machine was 60 inches in width, was built by Bryan Donkin, of London, and was imported by Henry Barclay, of Saugerties. After the machine was completed and the contract money paid, there was great delay in its shipment, owing to the fact that English manufacturers made strenuous and serious objections to its leaving the country. The objections were finally overcome and the machine shipped.

The machine was started by Mr. Adams on October 24, 1827, there working on the machine with him Adam Lindsay, Alexander White and David Grieve.

Of the owners Moses Y. Beach was the business manager, Hommerken was the clerk of the establishment, and Kearney was the silent partner. The mill was afterward owned by J. B. Sheffield & Son, and there were parts of the original machine in existence up to 1872, when the few remaining sections of it were destroyed by fire.

In 1829 another imported Fourdrinier was placed in the mill. It was 62 inches wide, and was built by Joseph Newbold, near Bury, England.

Peter Adams, to whom reference is made, was a steady Scotchman who came to this country when he was about twenty years of age. He was an exceedingly thorough workman, and made and sustained a reputation for making most excellent product.

In December, 1827, the second Fourdrinier in America was started at South Windham, Conn., by a Mr. Pickering. It was a 60-inch machine, and was built in England.

On March 10, 1829, the Collector of the Port at Boston, Mass., addressed to the Secretary of the Treasury the following letter:

"A man has just arrived in the ship Dover from Scotland, by way of Liverpool, who is a manufacturer of paper, and he has brought a machine and tools for carrying on the business in this country. I enclose his statement. Is the machine to be considered as his implement or tools of trade and exempt from duty?"

That was at the beginning of Jackson's presidential administration, and his first Secretary of the Treasurer was Samuel D. Ingham, who in early life was apprenticed to Langstroth, the Pennsylvania paper maker, and who therefore was naturally especially interested in the matter. On March 14, 1829, the Secretary replied from Washington directing that the machine be admitted free of duty. In this correspondence the paper maker

PETER ADAMS.

who owned the machine was not named, but the name is supplied by the passenger list of the Dover. It was William Marshall, and his belongings consisted of thirty-four cases of machinery.

The first Fourdrinier in New Hampshire was operated by Peabody & Daniell, at Franklin, in 1840. The machine was built at Windsor Locks, Conn., and was drawn from there to Franklin by two eight-horse teams.

American Sulphite Mills.

The sulphite manufacturers of the United States, including those making for their own use and for the market, are as follows: Colorado—Denver Sulphite Fibre Company. Connecticut—Derby Paper Mills Company. Maine—Cushnoc Paper Company, Howland Pulp Company, Katahdin Pulp and Paper Company, Lisbon Falls Sulphite Company, Manufacturing Investment Company, Rumford Falls Sulphite Company and Rumford Falls Paper Company, Eastern Manufacturing Company, Richards Paper Company. Maryland—Susquehanna Water Power and Paper Company, Cumberland Paper Company. Massachusetts—Mount Tom Sulphite Pulp Company, Russell Paper Company, New England Fibre Company. Michigan—Alpena Sulphite Fibre Company, Detroit Sulphite Fibre Company, Michigan Sulphite Fibre Company. New Hampshire—Burgess Sulphite Fibre Company, Glen Manufacturing Company, Excelsior Fibre Company, Odell Manufacturing Company. New York—J. & J. Rogers Company, George West, Dexter Sulphite Pulp and Paper Company, Glens Falls Paper Mill Company, E. C. Hargrave plant, Dnncan Company, Niagara Falls Paper Company, Hudson River Pulp and Paper Company, High Falls Sulphite Pulp and Mining Company, Piercefield Paper Company, Remington Paper Company. Ohio—The George H. Friend Paper and Tablet Company. Oregon—Crown Paper Company and Willamette Pulp and Paper Company. Pennsylvania—New York and Pennsylvania Company, Lock Haven Paper Company. South Carolina—Carolina Fibre Company. Vermont—Fall Mountain Paper Company. Washington—Everett Pulp and Paper Company. West Virginia—West Virginia Paper and Pulp Company. Wisconsin—Atlas Paper Company, Manufacturing Investment Company, Riverside Fibre Company, Ashland Sulphite Fibre Company, Combined Locks Paper Company, Badger Paper Company, Kaukauna Fibre Company, Kimberly & Clark Company, Marinette and Menominee Paper Company, and Nekoosa Paper Company.

They tell a story on an old-time manufacturer, which has lost none of its flavor because of its age. A seller, of whom he was buying stock, was objecting to the weight for which he was allowed compensation, whereupon the p. m. explained, "Why, what are you talking about? It was weighed on a faro bank scales."

A good many articles are made nowadays of paper and pulp, but some of the modern uses are simply "revivals." In the sixties they had paper collars, paper shirts, paper bonnets, paper hats and even paper coffins, so that the latter industry which is now being started up in this State is not new. An old-time genius made paper coffins, which he claims were "air-tight, water-proof and damp-defying," just as though the users of them would object seriously if these claims were not fully sustained. However, there are asbestos paper and board in these latter days, and they may present some advantages.

TABLE SHOWING THE DAILY CAPACITY IN POUNDS OF THE PAPER AND PULP MILLS OF THE UNITED STATES NOW RUNNING, AS REPORTED BY MANUFACTURERS FOR INSERTION IN THE TWENTY-THIRD EDITION OF LOCKWOOD'S DIRECTORY OF THE PAPER TRADE, 1897–8 (*a*).

PREPARED BY THE HOWARD LOCKWOOD PUBLISHING COMPANY FOR THE USE OF THE TRADE.

STATES.	Bind'r's and Trunk Board.	Blotting.	Book and News. (*b*)	Build'g, Roofing and Sheath'g	Card.	Carpet Lining	Chemical Fibre. (*c*)	Colored. (*d*)	Cotton Hull Fibre.	Fibre Board.	Fric't'n Board.	Hanging and Curtain.	Leather Board.	Manilla.	Manilla Board.	Press and Album Board.	Straw Board. (*e*)	Straw Fibre. (*f*)	Straw Wrapping.	Tissue. (*g*)	Tissue Manilla.	Wood Pulp. (*h*)	Wood Pulp Board.	Wrapping. (*i*)	Writing. (*j*)	Total Capacity of States.
Alabama	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	...	4,000	....	....	....	4,000
California	4,000	....	....	....	....	...	....	...	....	....	....	....	....	....	....	....	4,000	....	10,000	....	....	20,000	....	4,000	....	42,000
Colorado	....	....	48,000	....	....	....	16,000	....	....	....	....	....	....	13,500	....	....	....	....	3,500	....	....	32,000	....	....	14,000	130,000
Connecticut	42,000	6 000	100,000	24,000	17,000	....	30,000	25,500	....	8.000	....	2,000	19,000	62,000	...	27,000	54,000	....	14,000	21,000	4,000	....	39,000	58,000	47,000	594,000
Delaware	....	....	98,000	....	....	....	60,000	8,000	....	....	....	....	....	16,000	....	....	....	....	....	....	180	....	....	1,000	4,000	187,180
Dis. of Columbia	....	....	5,000	....	....	....	....	....	....	....	....	....	....	3.000	....	....	....	....	....	....	....	....	....	....	....	8,000
Georgia	....	1,000	5,000	....	....	....	....	....	....	....	....	....	....	4,500	....	....	....	....	....	....	....	2 000	....	10,000	....	22,500
Illinois	....	....	....	35,000	....	19 000	....	....	....	....	....	....	....	12,000	....	....	222,000	....	155,000	....	....	20,000	....	64,000	....	527,000
Indiana	29,000	....	100,000	60,000	....	4,000	80,000	....	....	....	....	....	....	71,000	....	....	438,000	....	58,000	5,300	1,100	167,000	82,000	38,000	....	1,133,600
Iowa	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	28,000	....	10,000	2,000	....	....	....	4,000	....	44,000
Kansas	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	10,000	....	14,000	....	....	....	....	10,000	....	34,000
Kentucky	....	....	25,000	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	25,000
Maine	....	....	1,020,000	....	....	....	714,000	....	....	....	....	..	29,000	296,000	....	....	....	....	....	....	....	1,262,000	88,000	10,000	....	3,419,000
Maryland	3,000	....	157,000	3,000	....	....	60,000	....	....	....	....	10,000	....	76,000	....	....	35,000	....	24,000	....	....	20,000	....	4,000	....	392,000
Massachusetts	8,000	16,500	671,000	53,000	89,500	15,500	75,000	39,000	....	....	....	25,000	29,000	235,000	....	2,000	29,000	....	20,000	12,600	2 600	102,000	20,000	42,000	562,500	2,049,200
Michigan	4,000	22,000	217,000	8,000	4,000	....	110,000	16,000	....	....	....	....	....	25,000	....	....	68,000	....	53,000	4,000	....	78,000	24,000	85,000	25,000	743,000
Minnesota	....	....	15,000	25,000	....	....	....	....	....	....	....	....	....	15,000	....	....	....	....	....	....	....	22,000	....	15,000	....	92,000
Missouri	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	3,500	....	....	....	....	....	....	....	....	3,500
Nebraska	....	....	....	20,000	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	20,000
New Hampshire	1,500	....	492,000	....	8,000	....	430,000	5,000	....	....	....	....	18,000	103,000	....	....	....	....	....	9,500	10,600	421,000	....	4,000	....	1,502,600
New Jersey	38,800	....	16,000	89,000	4,000	10,000	....	....	....	....	2,000	....	1,000	87,000	....	24,000	28,000	....	....	35,000	4,500	....	93,000	39,400	4,000	475,700
New York	10,000	....	2,050,000	122,000	15,000	16.000	780,000	46,000	....	....	....	109,000	10,000	700,500	....	8,000	123,000	....	105,900	30,750	39,150	2,810,000	110,000	140,500	55,000	7,280,800
North Carolina	....	....	6,000	....	....	....	....	....	....	....	....	....	....	4,000	....	....	....	....	....	....	....	5,000	....	3,000	....	18,000
Ohio	38,000	13,000	193,000	43,000	....	15,000	66,000	37,000	....	....	4,000	....	....	267,500	....	....	477,000	....	112,000	8,000	....	26,000	50,000	121,000	36,000	1,506,500
Oregon	....	....	100,000	....	....	....	37,000	....	....	....	....	....	....	11,000	....	....	....	....	10,500	....	....	103,000	....	11,000	....	272,500
Pennsylvania	47,500	....	401,500	200,000	11,000	14,000	373,000	43,000	....	....	....	17,000	3,500	217,900	....	12,000	34,500	....	19,000	11,800	4,700	118,000	20,000	122,500	56,500	1,727,400
South Carolina	....	....	....	....	....	....	10,000	....	24,000	....	....	....	....	16,000	....	....	....	....	....	....	....	....	....	....	....	50,000
Tennessee	....	2,000	....	....	....	....	....	....	....	6,000	....	....	....	....	....	....	....	....	....	....	....	4,000	8,000	2,000	....	22,000
Texas	....	....	6,000	4,000	....	....	....	....	....	....	....	....	....	9,000	....	....	....	....	4,000	....	....	....	....	3,000	....	26,000
Vermont	....	1,000	202,000	....	30,000	....	60,000	....	....	4,000	....	7,000	2.000	98,000	....	....	5,000	....	....	3,500	16,000	385,000	25.000	7,000	8,000	853,500
Virginia	....	26,000	3,000	....	10,000	....	40,000	....	....	....	....	6,000	.. ..	10,000	....	....	....	....	....	2,000	....	12,000	....	10,000	7,000	126,000
Washington	....	....	19,000	....	....	....	15,000	....	....	....	....	....	...	8,000	....	....	....	....	4,000	....	....	12,000	....	12,000	5,000	75,000
West Virginia	....	....	35,000	....	....	....	140,000	....	....	....	....	....	....	21,000	....	....	24,000	....	13,000	....	....	90,000	....	26,000	10,000	359,000
Wisconsin	....	....	995,000	29,000	....	15,000	353,000	4,000	....	....	....	....	..	174,000	....	....	30,000	....	26,000	5,000	4,000	733,000	20,000	25,000	94,000	2,507,000
Totals	225,800	87,500	6,979,500	715,000	188,500	108,500	3,449,000	223,500	24,000	18,000	6,000	176,000	111,500	2,555,900	....	73.000	1,613,000	....	655,900	150,650	86,830	6,448,000	579,000	869,400	927,500	26,271,980
" for 1896–7	230,300	79,000	6,025,500	652,000	155,500	89,500	3,418,000	192,500	24 000	18,000	4,000	208,000	105,000	2,375,600	14,000	52,300	1,468,200	....	733,300	138,100	75,280	5,609,000	482,000	891,900	899,500	23,980,480
	4,500	8,500	954,000	63,000	33,000	9,500	31,000	31,000	....	....	2,000	32,000	6,500	180,300	14,000	20,700	144,800	....	77 400	12,500	11,550	839,000	97,000	21,600	28,000	2,291,500
Percent. of gain	....	10⅛	15⅞	9⅛	2½	10 1/16	9/10	16	....	....	50	...	6½	17 4/11	....	39 1/13	9 1/11	....	....	10 1/10	15½	14 7/11	20½	....	3½	9 1/13
Percent. of loss.	2	....	....	....	....	....	....	....	....	....	....	15⅞	....	....	....	....	....	....	....	10⅛	....	....	....	2⅞	....	....
Totals for '81	124,120	11,500	1,390,050	153,800	41,000	2,250	259,500	111,900	....	....	....	112,200	94,300	648,900	....	7,600	505,000	25,000	502,400	14,300	40,180	484,300	39,000	428,400	305,700	5,301,400
Totals for '83	165,320	15,000	1,682,650	272,800	82,600	38,800	466,000	95,760	....	....	...	154,300	77,100	879,100	....	8,600	743,800	23,000	645,700	24,350	45,130	633,450	43,000	489,400	354,900	6,940,760
Totals for '84	153,600	16,800	1,998,050	314,250	84,500	35,900	576,000	104,400	....	....	....	159,300	129,100	809,700	....	9,600	786,800	23,000	718,500	23,650	40,530	795,550	46,000	517,000	409,000	7,751,730
Totals for '85	184,050	15,800	2,029,350	313,750	89,500	42,900	587,000	108,650	....	....	...	191,400	101,500	949,250	....	12,000	828,800	17,000	760,500	24,700	50,130	835,830	58,000	523,750	407,700	8,131,560
Totals for '86–7	200,650	22,600	2,142,900	256,750	108,500	41,400	537,000	106,150	....	....	....	191,400	92,250	943,250	....	9,800	881,050	12,000	797,900	25,250	58,980	960,600	65,000	486,550	407,000	8,346,980
Totals for '87–8	187,150	22,600	2,279,400	387,000	103,750	53,900	602,000	110,400	....	....	....	185,100	85,750	1,039,200	....	11,800	941,250	6,000	759,500	30,550	64,780	1,085,900	61,000	480,600	456,200	8,953,830
Totals for '88–9	209,650	25,100	2,661,550	377,000	106,250	49,900	617,000	121,600	....	....	....	210,100	71,500	1,092,400	....	10,800	988,500	6,000	885,200	36,250	50,880	1,536,500	83,000	477,250	474,700	10,091,130
Totals for '89-90	217,200	24,100	2,837,850	444,500	138,750	58,500	866,500	113,300	....	....	....	228,600	87,500	1,228,600	....	15,800	1,117,500	6,000	925,400	33,850	46,580	2,607,600	95,500	583,750	567,100	12,244,480
Totals for '90–1	229,300	31,600	3,081,350	525,500	147,350	60,000	1,111,500	131,850	....	....	....	224,400	92,800	1,357,400	....	18,800	1,344,000	6,000	923,000	36,450	53,030	2,900,700	129,500	595,750	560,000	13,560,280
Totals for '91–2	212,800	43,600	3,735,150	498,000	149,850	64,500	1,543,500	140,600	....	....	....	249,200	86,500	1,531,400	....	23,800	1.433,500	46,000	958,900	77,500	59,730	2,953,700	136,000	685,750	589,600	15,219,580
Totals for '92–3	208,300	53,000	4,233,150	514,500	183,250	74,500	1,736,000	176,500	....	....	....	265,000	87,000	1,720,900	....	23,800	1,545,500	....	960,000	88,500	103,480	3,400,300	187,000	703,700	706,000	16,970,380
Totals for '93–4	214,300	63.500	4,922,400	590,500	178,000	80,500	2,210,000	178,000	....	20,000	5,000	270,500	95,000	1,908,100	....	27,800	1.671,580	....	1,063,650	111.700	96,180	4,285,400	352.000	755.700	863 900	19,963,710
Totals for '94–5	223,300	63,500	4,923,000	640,000	195.000	70,500	2,526,000	171,500	12,000	25,000	9,000	234,500	87,000	2,007,600	1,000	27,800	1,574,200	20,000	1,193,200	104,200	79,680	4,705,900	368,000	856,400	877,500	20,996,180
Totals for '95–6	198,800	73,000	5,284,400	695,000	186,000	84,500	2,958,000	172,500	24,000	32,000	9,000	228,500	97,500	2,088,100	16 000	52.300	1,544,000	20,000	949,200	114,400	79,480	4,930,400	442,000	923,400	889,500	22,091,980
Percent. of gain since 1881	81 1/13	660 8/13	402 1/10	364 1/13	359¾	4722⅜	1229 1/11	99 8/11	....	....	....	56⅞	18 1/13	294⅞	....	860⅝	219⅜	....	30⅛	953⅛	116 1/10	1231⅜	1384 6/13	102 1/13	208⅜	395⅝
Percent. of loss since 1881	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....

(*a*) This table shows the daily CAPACITY, *not the actual production*, of all the mills. The basis of the table is the statement and *claims* of manufacturers. In some instances figures have been altered when manufacturers have reported a producing capacity which was evidently incorrect when compared with the size and number of engines, the power and other details in our possession, and which in themselves determine very closely what a mill can produce. About 10½ per cent. of the mills were idle at last reports, the capacity of which does not appear in this table. Total number of mills as last reported, 1,190; idle, 135.

(*b*) Every kind of book and news paper from all classes of stock is embraced in this column.

(*c*) These totals include the product of mills making chemical fibre solely, and a considerable quantity of fibre made by mills for their own use. The totals do not, therefore, represent the *entire* production of chemical fibre.

(*d*) All kinds of colored paper, except ordinary tinted book and writing, are included under this heading.

(*e*) This column includes many small "air-dried" mills, whose product for the season aggregates only a comparatively small amount.

(*f*) This does not include pulp made from straw at regular print mills, but only at such mills as sell to paper makers.

(*g*) Includes all kinds of white and colored tissue.

(*h*) Some ground wood pulp made and used at the paper mill is not included in these aggregates.

(*i*) Includes all grades of wrapping and bogus, except straw wrapping.

(*j*) Includes all grades of bank note, ledger, flat and folded, tub and engine sized, and envelope paper.

THE BOSTON TRADE.

Changes Which Have Taken Place During the Past Few Years.

EASTERN OFFICE PAPER TRADE JOURNAL,
64 Federal Street,
BOSTON, October 12, 1897.

Since this week's issue of THE PAPER TRADE JOURNAL is to be of special interest because of its commemoration of the twenty-fifth year of its publication, your correspondent takes advantage of the occasion to drop into reminiscences, and will refer to some of the changes that time has wrought in the local trade.

What the conditions were in 1872, when the late Howard Lockwood published the first issue of THE PAPER TRADE JOURNAL—the first paper published in the interest of the paper trade—the writer has no personal recollection, as his time then was passed in Southern climes—New Orleans, La., the city of his birth—and not until the summer of 1880 did he find himself in the classic town of Boston.

It was in 1883, October 1, that the writer connected himself with the Lockwood Press as its Boston representative.

Fourteen years have passed since then, and those years have brought many changes. Many of the prominent representatives of the Boston trade of those days, like the founder of THE JOURNAL, have passed away; new firms have been established, and some old-time concerns have dropped out; misfortune has befallen some, while others have achieved success.

Of the paper-manufacturing firms having an office location in this city when your present representative first began to write these "Boston Letters" for THE JOURNAL, a few have retired. In those days the names of the Page Paper Company and Thomas Rice, Jr., & Sons, were familiar, but now no more. The Fairchild Paper Company retired a few years later, its plant at Pepperell, Mass., being since acquired by the Nashua River Paper Company, of which George T. Keyes is president and treasurer, and some six months ago the Bacon Paper Company called its creditors together, and it is feared that that concern will never again become much of a factor in the paper trade.

The changes that the past fourteen years have wrought show themselves more noticeably in the paper-jobbing branch of the trade, and in that line the constantly increasing volume of business in paper is in plain evidence.

The oldest paper-jobbing house in Boston is that of the A. Storrs & Bement Company, although since first established over fifty years ago by Amariah Storrs the name of the house has changed from time to time. Some ten years ago the present management took hold of the business, and to its old, honored name and years of prestige has been added that success which young blood, enterprise, and progressive development always bring. Before undertaking the task of placing that old-established house in the front rank of the city jobbing-paper firms Charles M. Bryant and Robert C. McQuillen were connected with Carter, Rice & Co., while William F. McQuillen was brought up in the house of John Carter & Co. That they learned the business thoroughly, possessed more than ordinary ability, and were able to take advantage of opportunities for the advancement of their interests is very self-evident from the successful results which they have accomplished.

With the houses of John Carter & Co. and Carter, Rice & Co. changes have not been numerous, and such changes as call for notice are in the line of increased business, enlargement of quarters and progressive development.

In 1883 Carter, Rice & Co. occupied quarters at No. 252 Devonshire street, where they had been located for a dozen years or more. In 1888 the firm bought the seven-story building, No. 246 Devonshire street, which was fitted up in a manner somewhat in advance of anything known to paper stores at that time. It is doubtful if there is a jobbing-paper house in the country that has so many people in its employ as the firm of Carter, Rice & Co.

With John Carter & Co. changes of business location have been more frequent, but those changes were made necessary by the demands incident to increasing business. When first coming to the notice of your correspondent John Carter & Co. were doing business at No. 123 Franklin street, and the floor area then used would not equal the space of the basement of their present big store, Nos. 100 and 102 Federal street. Other locations had been secured from time to time as necessity compelled, until the firm's present store was occupied in 1894.

The Rice-Kendall Company yet occupies the store 91 Federal street, into which the firm moved soon after the big Boston fire in 1872, and it is one of the paper-trade landmarks of Federal street. The records of this house date back to ancient history, under the name of Rice, Kendall & Co. succeeding Wilkinson, Carter & Co. some years before the war. Charles S. Kendall and the Hon. Alexander H. Rice, the heads of that house, were getting well along in years when the writer's connection with THE JOURNAL began. They have since passed away, the management of the business being now in the hands of Charles S. Kendall, Jr., and F. S. Arnold, who, assisted by a corps of able associates, look after the business end, while Henry D. Pope manages the financial department.

Associated with that house for many long years was J. Willard Rice, who in his prime was recognized as one of the leading paper salesmen of his day. He was personally known not only to the leading paper manufacturers of the country, the product of many of which he handled, but to the prominent publishers as well. He was a large, robust man, able and diplomatic in his business relations, kind and generous. The writer remembers him as he was in the early eighties, and pays this tribute to him, in recognition of the many favors always so kindly extended. During the past few years he has been frequently seen on the street, but the portly form and firm step have disappeared, his feebleness ofttimes calling to his aid some friendly hand, while making his way from place to place. For some months he has been confined to his home. May his few remaining days be calm and peaceful, and may thoughts of him call up memories of his palmy days that were, forgetting the change that time has brought upon him.

Getting back again to issues in review, the house of Pulsifer, Cook & Co. comes in for mention by reason of the change in firm name which took place a year or more ago. In 1883 the firm was located at 45 and 47 Federal street, the house then doing business under the name of Pulsifer, Jordan & Wilson. Messrs. Pulsifer and Jordan had been associated together for twenty-five years or more, and when Colonel Jordan retired Messrs. Cook and Vivian, who had been with the house for many years, were admitted to partnership, when the firm name became Pulsifer, Cook & Co. The firm is now located at 183 to 193 Congress street, into which quarters it moved some few years ago.

Over the way, occupying a spacious store of several stories, which numbers from 180 to 188 on Congress street, is the firm of Wm. H. Claflin & Co., the big blue sign boards ornamenting the front of the building from "turret to foundation stone." Only fifteen years ago small tin signs on the corner of the building that stands on Franklin and Devonshire streets indicated that Wm. H. Claflin & Co. did business in the basement there. True, it was a spacious basement, and it was always overcrowded with stocks of paper, but there came a time a few years ago when Mr. Claflin decided to heed the demands of his growing business, and then the move was made, and then the firm added white papers to its manilla lines.

On the same street, at Nos. 198 and 202, is the J. P. Jordan Paper Company, the youngest of the city jobbing firms, the company having been established about two years ago when Colonel Jordan retired from his old firm connections. For a new firm the company has had quite a success so far and gives promise of keeping itself in line with the older concerns of the city trade.

Another Congress street house to establish itself since the writer came into the local field is that of Charles D. Brown & Co., Nos. 156 and 158. This firm took a leading place in the ranks of the city trade from its very start and bids fair to hold its own without any changes beyond such as are incident to the developing of business.

At No. 169 Congress street is located the jobbing firm of D. F. Munroe & Co., this house having succeeded to Waterhouse, Shannon & Munroe some few months ago, the latter concern dating back only a few years. A dozen years ago each of the gentlemen forming the firm of Waterhouse, Shannon & Munroe were connected with the Rice-Kendall Company, leaving that house together to manage the paper department of Train, Smith & Co., from which management they retired in a few years to organize the company bearing their names. Associated with D. F. Munroe in the new firm is E. P. Lindsay, a bright young man of considerable ability and energy.

Coming now to the manilla branch of the trade, those making a specialty of such lines and not carrying print papers or writings, as many of the firms heretofore mentioned do, the firm of Stone & Forsyth is first in mind. Few firms have made more progress during the past fifteen years than has this house. When first coming to the notice of the writer Stone & Forsyth occupied little quarters in the basement at No. 60 Federal street. A few years later the store No. 268 Devonshire street was taken, and ere long rear buildings were connected by enclosed passageways, printing presses put in, and a box factory ordered, and what was the stock room on the street floor was fitted up as a sample room, with ample desk accommodations for clerks, counting room and private offices. Only recently the firm has been obliged to secure more spacious quarters elsewhere for its manufacturing and printing department.

Other firms catering to the manilla and printed wrapping trade have shared in the growing demand, among them being Whitney Brothers, who in 1883 were located at No. 57 Kingston street. Five years later the firm moved to Nos. 63 and 65 Essex street, where they are yet located. Their present quarters are well adapted to the needs of their business, which is evidently of a much larger volume than when Kingston street claimed them, back in the eighties.

Over at the other end of the town, in the neighborhood of the big Quincy Market, are several jobbing paper concerns well known to the trade at large, some of whom have seen many changes in the past ten years.

Stimpson & Co., while yet located at No. 65 Chatham street, have for some years past been managed by William W. Jenks, the founder of the house, Henry Q. Stimpson, having passed away in the prime of manhood. So well established was the business and so valuable the firm's trade connections that the house has continued to prosper under the able management of Mr. Jenks.

The Higgins, Snow Company, now incorporated, of which B. L. Heath is the treasurer and F. L. Andrews is vice-president, succeeded the old-time house of Higgins, Snow & Co., which for a generation occupied quarters at 36 Merchants Row. Some years ago Mr. Snow retired and later J. P. Higgins died, and then the present change in name took place and a larger store was taken on the opposite corner, where a successful business is being carried on under the directing management of Messrs. Heath and Andrews.

With F. A. Smith & Co., No. 37 John street, changes have not been numerous, either in locations or in the personnel of the firm. Some twelve years ago Mr. Smith bought out his partner's interest, the firm name then being Bacon & Smith, leased the building on John street, moved in and placed the name of F. A. Smith & Co. over the door. And there has he been ever since, or rather the firm has, since Mr. Smith does a good deal of getting about and can't always be found in the firm office. As selling agent for different mills the firm handles quite a tonnage of paper during the year.

M. A. Swift's Sons (Incorporated) is now the name of the house which in 1883 and for some years previous was known as Moses A. Swift, then located in small quarters at No. 33 Exchange street. In 1894 the firm was obliged to seek more spacious quarters, which were found at No. 15 on the same street, where it is still situated. While doing a good business in manilla and straw wrappings, the firm makes a specialty of toilet papers and papeteries, in which lines its trade has been largely developed.

In 1883 E. H. Haskell was doing business at No. 24 Federal street, where he had "desk room." That Colonel Haskell worked up quite a business since then is evidenced by the store he now occupies at No. 11 Otis street, in Winthrop square, into which he moved a few years ago. But the magnitude of his business cannot be measured by that store, since he is interested in paper mills and distributes a great deal of paper direct, besides supplying mills with wrappers and twines.

H. K. W. Hall, one of the old-time firms of Boston, occupies his old stand at No. 165 Devonshire street, where he has been located for almost a generation.

C. B. Botsford & Co., for fifteen or more years located at No. 25 Hawley street, only recently removed to Kingston street.

Of the new firms deserving of mention because of the progress made is that of W. B. Tyler & Co., which under the single name of W. B. Tyler started a few years ago in a small way in a basement on Devonshire street. Now W. B. Tyler & Co. can be found at No. 97 High street, in quite a spacious store, which from appearances is not large enough for its business of to-day. Paper, twine and boards are the firm's specialties.

V. H. Hall & Co. as a firm established themselves about a dozen years ago, and since then have built up a business requiring more extensive facilities than at first enjoyed. The firm is now located at Nos. 85 and 87 Pearl street. Paper, twine and mill supplies are the special lines being pushed by the firm.

Nelson Curtis took his stand on Federal street as a paper dealer in the early '90s. He interested himself in perfecting the manufacture of photograph paper, in which he has been quite successful, and organized the American Photographic Paper Company. He removed his business office a few years ago to No. 2304 Washington street, in the Curtis Block.

Joseph C. Godfrey joined the local paper trade only a few years ago. His business office is in the Exchange Building on State street, and he has a warehouse at No. 405 Atlantic avenue.

Bevan, Husted & Co., of 77 Bedford street, is one of the recent firms of the trade. This house started in less than twelve months ago, and has its record yet to make.

In reviewing the changes of the past fourteen years the writer has so far confined himself to the local jobbing firms. The manufacturing end of the business has also undergone many changes in those years, but time will hardly permit extended reference to them. Of the many paper mills located throughout New England whose business offices are in this city none have passed through the varying conditions of the past dozen or more years without experiencing many changes. That the Boston paper manufacturers have held their own during the past few years of depression, and have been able to adjust themselves to the changing conditions, reflects credit upon their business ability and their resources. May the years to come prove less trying and more prosperous.

Coming now to the paper-stock branch of the trade, that business has also undergone some changes in recent years. Of the paper-stock importing firms doing business in this city back in 1883 only a few are now in the business. Lee & Sturges dropped out of sight years ago; M. A. Ring & Sons went through several changes, and with the death of David M. Ring the firm ceased. T. F. Ring, at one time a member of the firm, is still in the business in a limited way. W. F. Paul retired and is now engaged in other business. Horace Dutton, now Horace Dutton & Co., has returned to the ministry, which he retired from to go into the paper-stock business, the firm now being under the management of B. F. French, who for several years past has been a member of the firm. Charles A. Cheney has passed away, the business now being carried on by Edwin Butterworth & Co. at the same place, with Charles H. Wood manager, for years in the employ of the late C. A. Cheney. Train, Smith & Co. remain in the business, and they are yet located at the same old place, No. 24 Federal street, where the writer first found them fourteen years ago. E. Story Smith, who with Colonel Train organized the firm in 1880, has been confined to his home for some three or four years, and it is feared that his remaining days are not many.

Another leading paper-stock house of those early days was H. M. Knowles & Co., who occupied the very office in which the writer is now penning these lines. Some ten years ago, if memory is correct, Mr. Knowles became interested in the manufacture of news paper, associating himself with I. B. Hosford. Those gentlemen now are the controlling force in the business of the Haverhill Paper Company and the Glen Manufacturing Company, as they have been from the organization of those enterprises.

Dealers in domestic paper stock were quite numerous in those by-gone days, but now the business is in the hands of fewer people, and the trade is controlled by three or four packers, of whom Wm. J. Corbett & Co. are recognized as the leading house.

Such are a few of the changes that come to the mind of the writer which time has brought about during the past fourteen years. And now this thought presents itself: Will the time come for your correspondent to celebrate his twenty-fifth anniversary as the Boston representative of THE PAPER TRADE JOURNAL? Looking backward, his fourteen years of service seem like a very short time, so pleasant have those years been, and so kind and generous have been those that make up the ranks of the paper trade among whom it has been his privilege to labor. The writer has ofttimes had occasion to pay personal tribute to his many friends of the trade for the many kind favors they have so generously extended, and now he would again avail himself of this opportunity to acknowledge his appreciation of their kindness and their friendship.

Because of their cheerful endorsement of his efforts in their behalf your correspondent has been able to labor in this field for fourteen years. While being proud of the record, the writer is not unmindful of the fact that to his paper-trade friends is due the credit of his long connection. May the years to come bring fewer changes, and may those changes prove of benefit to the paper trade and to those engaged in its development.

DELESDERNIER.

The Lockwood Manufacturing Company, Philadelphia, Pa., has been reorganized as the Lockwood Folding Box Company Limited. Charles L. Lockwood, a member of the old firm, is president, and E. J. Barnes secretary and treasurer. Charles Lockwood authorizes the statement that his brother, William E. Lockwood, who was connected with the old firm, has no interest in the new company and that he does not represent it in any way. Most of the stock of the old firm has been bought in by the company, and it will continue on the same lines as the old firm did. Extensive changes will be made, but not until after the advent of the new year. James S. Freeland, assignee, who last week filed his first account, is at work on the books yet, and it is entirely probable that the amount ready for distribution, $10,171.71, will be increased by several thousand dollars from book accounts outstanding. Francis Shunk Brown is to meet all parties interested at his office.

Wants and For Sale.

Twenty-five words or less, one dollar each insertion. Over twenty-five words, four cents a word each insertion, up to eighty words. Cash should accompany order.

Over eighty words, or displayed advertising, will be charged for by the inch, according to our regular schedule of rates.

Answers can come in our care and will be promptly forwarded without extra charge.

WANTED—ONE STACK OF KNIGHT'S Dryers, about six in the stack. THE MOORE & WHITE CO., Philadelphia, Pa.

WANTED—POSITION, FOREMAN, BOSS machine tender or night foreman; have many years' experience making all grades of papers and coloring; can furnish reference. Address P. T. J., care Journal.

POSITION WANTED—BY A MACHINE TENder of fifteen years' experience. Guaranteed capable and sober; married man; good references given. Address V. S., care Paper Trade Journal.

WANTED—A POSITION AS SUPERINTENDent in a mill making colored covers, posters, colored manillas, or No. 1 or No. 2 manillas. Sample of covers submitted. Correspondence solicited. Address WHITEMAN, care of Paper Trade Journal.

FOR SALE—30,000 HORSE POWER SITE, NOT far from Montreal and accessible by boat and railway; unlimited supply of spruce wood convenient and cheap. Address WM. ANGUS, 759 Craig St., Montreal, Canada.

FOR SALE—THE HANMER & FORBES CO.'S paper mill at Burnside, Conn. C. F. Hanmer, Sec'y.

FOR SALE—TWO LARGE-SIZED GOULD Screens, in good condition, now running; one pair of large-sized Evans Friction Cone Pulleys, suitable for 62-inch machine. The above will be sold at low prices. Address HOLLINGSWORTH & VOSE CO., Boston, Mass.

FOR SALE—AT A SACRIFICE, PAPER-MILL machinery. The entire paper-mill machinery, in first-class order, contained in our mill will be sold cheap or leased with the property.

D. W. SIMONS,
Detroit, Mich.

AT AUCTION.

Fully Equipped Pulp and Paper Mill.

Grand water power, held by cemented stone dam; modern machinery, buildings and fixtures; low freight rates, cheap wood, labor, coal. For detailed information, date of sale, etc., apply to

A. H. BURROUGHS, Trustee,
Lynchburg, Va.

OWEN PAPER MILLS,

Housatonic, Mass.,

FOR SALE OR RENT. Address
DR. THEO. GEDDINGS,
Housatonic, Mass.

FOR SALE OR EXCHANGE.

One 82-inch special Leffel Water Wheel with 8-foot Core Wheel, Pinion, etc.

Also one Marshall Engine in good order, in use at present. Would take stack of 82 or 84-inch Calender Rolls. Also Two Jordan Engines in good repair.

Address EXCHANGE,
care Paper Trade Journal.

FINE PAPER MILL
FOR SALE OR RENT.

Steam and water power, near New York; 6,000 lbs. daily; good order; now running.

Address C. D. B., care Paper Trade Journal.

The Advertiser

offers upon favorable terms a location in Northwestern Pennsylvania for a pulp and paper mill, commanding a million cords of wood, half of which can be delivered at mill for $3.00 per cord, and twelve to fifteen million tons of bituminous coal costing 60c. per ton at mill. Good shipping facilities. Address PENNA.,
Care Paper Trade Journal.

WANTED.

A partner in paper mill, one who would be able to take charge and manage said mill; capital required, about $3,000.

Address,
J. H. S., Paper Trade Journal.

FOR SALE!

Beaters: One Umpherston; one 1300 Iron Side Holland and many others.
Boilers: Six 6 ft. x 17 ft.; four 5 ft. x 16 ft.; five 4 ft. x 16 ft.
Calenders: Two stacks 66 inch; one 3 roll board.
Cylinder Moulds: One 30 x 62, newly covered.
Cutters: One 44-inch Stevens; one 72-inch Black & Clawson; one 96-inch Smith & Winchester.
Dryers: Four 28 x 62.
Jordans: Twenty-eight Jordans, all makes.
Fifty Tons Pulleys.
Pumps: Three Corliss, double power, 6-inch plungers; one steam boiler feed, 1⅝ suction; six 6-inch stuff pumps.
Plate: One 36-inch wood and steel.
Reel: One 62-inch 5 roll revolving; one 67-inch 12 roll revolving.
Screen Plates: Eight 12 x 40.
Steam Engines: One 14 x 40 Geo. Corliss; one 16 x 48 Geo. Corliss; one 26 x 48; one 26 x 60; one 14 x 14 Upright Putnam.
Stevens Digester: One.
Washers: Seven cylinder washers.
Sturtevant Blowers: Two No. 5.
One 62-inch Double Cylinder Machine Complete.

EMERSON MANUFACTURING CO.,
Lawrence, Mass.

FOR SALE—A SECOND-HAND COPY OF Hofmann's Treatise on Paper Making, in first-class condition; edition of 1875. For further particulars address SACRIFICE, care of The Paper Trade Journal.

A RARE BARGAIN.

Two Fourdrinier Machines for Sale.

These machines have recently been remodeled and are now running constantly on a high grade of book paper. They are excellent machines, doing good work and turning out a large quantity of paper daily. These machines must be sold in the near future, and prospective customers can see them running any day in the week except Sunday.

FOR FURTHER PARTICULARS ADDRESS:

THE BLACK & CLAWSON CO.,
HAMILTON, OHIO.

F. H. DAVIS & CO.,

Dealers in Paper Machinery, Engines, Boilers Shafting, Pulleys.

EXCHANGE BUILDING, BOSTON, MASS.

SEND FOR CATALOGUE.

One 76-inch Fourdrinier machine, taking 40-foot wire; 11 x 36 inch dryers; two stacks of heavy chilled rolls, reel and cutter. Machine fitted complete with Marshall drive and all the modern improvements throughout; used less than two years in present locality.

One 76-inch Black & Clawson cylinder machine complete with sixteen dryers, revolving reel; cone pulley cutters and rewinder, all fitted up with Marshall cone drive; modern improvements complete.

One 72-inch Rice, Barton & Fales Fourdrinier, with 40-foot wire; gun-metal couch and press rolls; seventeen 36 x 68 inch dryers; two stacks of calenders; reel slitters and Manning winder.

One 74-inch Fourdrinier; gun-metal press and couch rolls; eight iron dryers, 36 x 72 inches; calenders, reel, cutter, slitters and winder complete.

One 70-inch double cylinder machine with gun-metal press rolls; ten iron dryers, 36 x 72 inches; calenders, reel, cutter, slitters and winder complete.

One 18 x 48 inch Geo. H. Corliss engine; one 14 x 36 inch Harris Corliss engine.

One 85-inch Finlay cutter; two Success screens.

Fifty iron dryers, from 44 to 86 inch face.

Two Globe rotaries; one 7½ x 20 feet, horizontal rotary.

One stack of calenders; eleven rolls, 84 inch face.

One eleven-roll stack of calenders, 83-inch face.

One Emerson Jordan.

Two Patent Emerson beating engines.

Ten 36 x 78 inch iron dryers.

JAMES GASKELL,

—FIRE ADJUSTER.—

DEALER IN

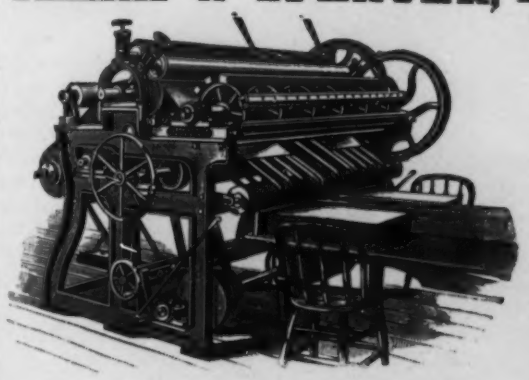
Paper Mill Machinery and Mill Property,

249 Front St., NEW YORK.

I HAVE FOR SALE

two National pressure filters that will filter 800 gallons water per minute, with pump valves and pipe, that has only been used about six months; one 84-inch Fourdrinier with 33 feet 3 inch wire, with gun metal couch and press rolls. Dimension of dryers 36 inches, with one stack of calenders, reel slitters and Manning winder; one 44-inch cylinder machine; three moids, thirteen dryers, seven bottom six top, with reel and calenders, just right for making strawboard lining paper; one strawboard mill complete, and one Jager liner; fifteen dryers 36x96, Black & Clawson's make; seventeen 36x74 dryers; eight 36x86 dryers, iron frame and boxes complete; two beating engines, 40-inch rolls; one Jordan engine, three Kingsland engines, one rotary bleach, and one large size Poole grinder; one binders' board mill complete, including one hydraulic press, one set 42-inch board calenders 15 inches in diameter; two wet machines, one 76, one 44 inch, and 120 New Haven plates; one Otis elevator, two shapers and one planer, also number of lathes, three steam boilers, one 150 horse power, built for the Russian Government, pressure 200 pounds.

CLARK & SPENCER, LEE, MASS.



Revolving Paper Cutters,
Rag Cutters,
Cylinder Machines,
Washing and Beating Engines,
Chilled Iron Calenders,
Fan and Stuff Pumps,
Engine Roll Bars.

FOR SALE.

One gun-metal Couch Roll, 20x120 inches.
One 98-inch Fourdrinier part for 40-foot wire.
Eight Doctors complete for 90-inch face calenders.
One seamless Dryer, new, 48x90 inches.
All in first-class condition.

BLACK & CLAWSON CO.,
Hamilton, Ohio.

PAPER MILL FOR SALE.

Best Location in the West, best water power in the West. In one of the best towns of the West. Best home market of the West.

Now running on book and news. The right party can secure A 1 plant for a small cash investment.

Address B, care of Paper Trade Journal.

FOR SALE!

Sixty-four inch machine, five dryers; one small 48-inch machine; two iron beaters, six and seven hundred pounds each, wood bottom; two chill rolls; 64-inch machine; rag cutter, first-class order; 20 horse-power engine; pulleys, gears, shafting, split wood pulleys, etc.

Can be seen on the premises of the F. E. Sterne Paper Company, Chatham, N. Y. For further particulars, address

W. G. MORTON, Albany, N. Y.

FOR QUICK SALE—CHEAP FOR CASH.

All articles in good condition, to be sold on account of change of mill to calender machines.

1 72-inch Fourdrinier machine, without dryers,	GOOD AS NEW.
10 72-inch Calender chilled rolls, 5½ and 7 inches diameter,	A1 CONDITION.
1 Cylinder machine frame,	GOOD; HEAVY.
Dryer frames for twelve dryers.	
2 72-inch slitting and re-winding machines,	GOOD RUNNING ORDER.
1 Pusey & Jones revolving reel—six reels, used but short time,	GOOD AS NEW.
A number of iron rolls for top of dryers.	
1 60 Horse power upright boiler.	GOOD CONDITION.
1 40 Horse power steam engine.	GOOD CONDITION.
1 Lot pulleys and fittings.	

Everything in good condition and sold cheap for cash.

Address: N. J. W. P. & P. B. Co., 315 Drexel Building, Philadelphia.

PAPER MILL FOR SALE,
Southford, Conn.

DESCRIPTION.

BUILDINGS. This mill, erected in 1882, is constructed entirely of **brick** and **stone** with **slate roof**. There are six frame dwelling houses, containing eight tenements, two commodious storehouses, one large barn, one machine shop, one blacksmith shop, coal sheds, etc.

MACHINERY. One Smith & Winchester 72-inch four cylinder machine, with sixteen 36-inch dryers, and one eleven and one six roll stack of calenders; one 1,200, three 800 pound beating engines and two Jordan refining engines; one 7 x 16 feet rotary boiler, one rag cutter and duster, one 80 horse power Fitchburg horizontal steam engine, one condenser, one 25 horse power upright steam engine, three 75 horse power horizontal steam boilers, one large Acme paper cutter, three power elevators, three sets Fairbanks stationary scales, two portable scales, one Crocker rotary fire pump, automatic sprinklers, fire hose, hydrants, etc.; steam heating; one Herring Champion Safe, large size; lamps, belting, trucks, office furniture, etc.; machine shop contains upright power drill, planer, full set of small tools, 10 horse power upright steam engine, piping, tools, etc.

REAL ESTATE. Eighty acres of meadow and wood land, including two mill privileges at outlet of Lake Quassapaug.

WATER POWER. Mill is run by four 15-inch National water wheels under **94 feet head.** Lake Quassapaug, located five miles above mill, is the source of water supply. It covers an area of 274 acres and contains 2,600,000,000 gallons of water. The privileges at the outlet of this beautiful lake are owned absolutely by this mill property, thereby controlling its waters. Eight Mile Brook connects this lake with mill pond five miles below. This brook drains a large watershed. The **quantity** and **quality** of this water supply are **unsurpassed.**

Mill is in complete running order. Location for freight will compare favorably with **any mill in New England.**

Property open for inspection at all times by appointment.

....Address, **HEIRS OF L. C. WHITE,**
WATERBURY, CONN.

The Central Paper Co.,

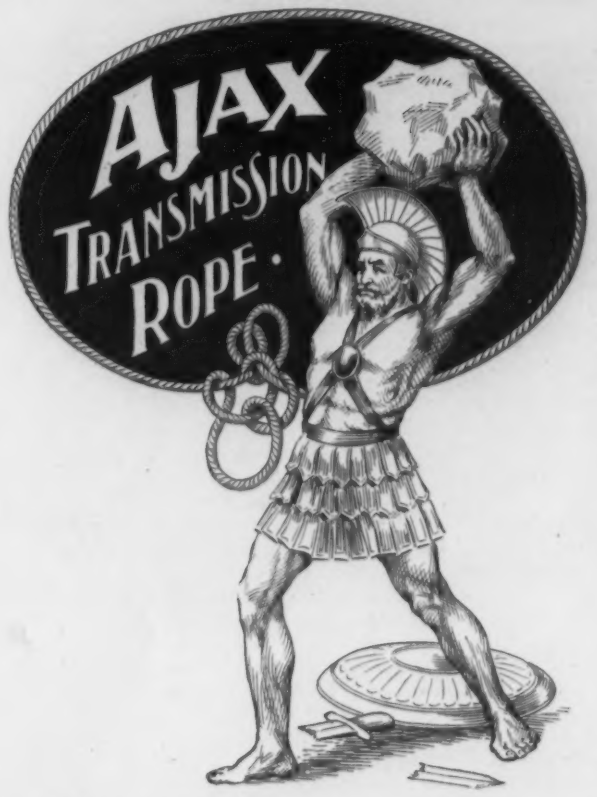
177-179 Monroe Street,
CHICAGO.

LEDGER,
FLAT WRITING,
CARD BOARDS,
ENVELOPES,
BOOK COVER and
PRINT PAPER.

WE CAN FURNISH OUR

Ajax Transmission Rope

IN ALL LENGTHS AND SIZES.



H. CHANNON COMPANY,

24-26 MARKET ST., CHICAGO.

Send for our book on Rope Transmission, mailed without charge to those interested in the subject.

A PIONEER PAPER MAKER.

THE BEGINNINGS OF PAPER MANUFACTURING AT DALTON.

Zenas Crane—Where He Learned His Trade—His Pilgrimage to Dalton—Establishment of the First Mill—The Wages of Those Days—The Widespread Results of the Venture.

ZENAS CRANE, the pioneer paper maker of Berkshire County, Mass., was born at Canton, Norfolk County, Mass., on May 9, 1777, and was a son of Stephen and Susannah (Babcock) Crane. His brother, Stephen Crane, Jr., was a paper maker, having learned his trade in the mill at Milton, which was built by David Henchman in 1830. After a few years it suspended operations, owing to lack of workmen, but in 1760 it was set to work again by the aid of a British soldier on furlough.

Having learned his trade, Stephen Crane, Jr., left Milton and established himself at Newton Lower Falls, and it was in this mill that his brother Zenas became acquainted with the art of converting rags into paper. Later he went to Worcester and worked in the mill of General Burbank.

In 1799 Zenas Crane, buoyed by a determination to start in business on his own account, left Worcester and started westward. He reached Berkshire, and spent his first night at a small inn between Dalton and Pittsfield, near which now are the mills and residences of those of his family who have succeeded to the business of which he was the founder.

Mr. Crane decided to cast his lot in Dalton, and on February 8, 1801, there appeared in the Pittsfield *Sun* the following advertisement:

AMERICANS!

ENCOURAGE YOUR MANUFACTURES AND THEY WILL IMPROVE.

LADIES, SAVE YOUR RAGS!

As the subscribers have it in contemplation to erect a paper mill in Dalton the ensuing spring, and the business being very beneficial to the community at large, they flatter themselves that they shall meet with due encouragement, and that every woman who has the good of her country and the interest of her own family at heart, will patronize them by saving her rags and sending them to their Manufactory or to the nearest Store Keeper, for which the subscribers will give a generous price.

HENRY WISWELL,
ZENAS CRANE,
JOHN WILLARD.

Worcester, Feb. 8, 1801.

During the interval when Mr. Crane decided to locate at Dalton and the appearance of the advertisement quoted, he returned to Worcester, and when the enterprise was finally under way Daniel Gilbert took the place of John Willard. The site selected for the mill was owned by Martin Chamberlain, and with a caution for which he was noted he agreed orally that he would give a deed of the place, when the "thing was done," he apparently having great doubts as to the ability of the partners to establish the paper mill. Evidently, however, they proved their ability, for, on December 25, 1801, Mr. Chamberlain conveyed to the partners 14 acres, 149 rods of land, together with a paper mill and appendages thereon standing, the consideration being $194.

The building erected by the firm was a two-story one-vat mill, the upper story being used as a drying loft. The plant had a capacity of a "day's work" of twenty posts, a post being 125 sheets of paper. The force employed in the mill consisted of an engineer at $3 a week, a vatman and coucher at $3.50 each, without board; one additional workman and two girls at 75 cents a week each, and a lay boy at 60 cents, all being boarded.

It is not stated just what the compensation of Mr. Crane, who was the practical man of the establishment, and who held the position of superintendent and general manager, was at that time, but a few years later his partner allowed him $9 a week.

Mr. Crane conducted the mill since known as "The Old Berkshire," encountering and overcoming many difficulties until 1807, when he sold his undivided third interest to his partner, Mr. Wiswell. Mr. Crane then went to the eastern part of the town, where he engaged in mercantile business until 1810.

In 1809 the second paper mill was built at Dalton, and was operated by Carson, Chamberlin & Wiswell, David Carson, who had come to Dalton in August of that year, being installed as manager. On April 6, 1810, Mr. Crane bought David Carson's interest in this mill, which later became famous as the "Old Red Mill," and it was conducted for a time afterward by Crane, Wiswell, Chamberlin & Cole, Mr. Crane becoming superintendent and manager. This firm was succeeded by Crane, Chamberlin & Cole, but in 1822 Mr. Crane became the sole owner.

Up to 1831 the paper in the Crane mill was all made by hand. Most of the vat men were Englishmen or Scotchmen, and many of them were given to both tramping and drinking, so that the course of the early manufacturer was not as easy as it might have been. In 1831 Mr. Crane installed an Ames cylinder machine, and in 1834 he added cylinder dryers. He made paper of good quality, and built up a reputation which has always been maintained by those who have followed in his footsteps.

In 1842 Mr. Crane transferred his interest in the "Old Red Mill" to his sons Zenas Marshall and James Brewer, who were already his partners, and they steadily improved the mill and the quality of its product until it was totally destroyed by fire in the fall of 1870. There was no insurance upon the plant, but the mill was immediately rebuilt on a larger scale and fitted with the most improved machinery of the time. It is now known as "The Pioneer Mill."

In 1879 Crane & Co. were awarded the contract for supplying the Government with paper for the currency, and in order to carry out the contract properly they purchased the mill which had been built at Coltsville by Thomas Colt. This mill is now known as "The Government Mill," and it is devoted mainly to the making of bank-note paper.

In 1846 Zenas Marshall Crane devised the placing of silk threads in bank-note paper, in order to prevent counterfeiting, but he did not secure a patent, as the idea was discountenanced by bankers generally, although several banks had their notes printed on such paper. Twenty years later some of these notes enabled the Federal Government to successfully resist the demands of an Englishman who asked for royalty, claiming to hold a patent for the system.

In 1836 the owners of a woolen mill situated midway between the Government and Pioneer mills met with financial disaster, and in 1850 the firm of Crane & Wilson began to operate it as the Bay State Mill, the members of the firm being Seymour Crane, the youngest son of Zenas Crane, and James Wilson, a skillful workman, who had served his time with the pioneer. In 1865 this property was rented by Zenas Crane, Jr., the eldest son of Zenas Marshall Crane, who later acquired all interest in the property. The mill was operated successfully by him until May 15, 1877, when it was burned. It was immediately rebuilt on a larger scale by the new firm of Zenas Crane, Jr., & Brother, the junior partner being Winthrop Murray Crane. In February, 1889, the firm became Z. & W. M. Crane.

In 1847 Lindlay Murray Crane, the third son of the pioneer, established a mill at Ballston Spa, N. Y., where he resided until his death, in 1879. Robert B. and James A. Crane, sons of James Brewer Crane and grandsons of Zenas Crane, now operate three mills at Westfield, Mass.

Zenas Crane died June 29, 1845, and his widow, who was Lucinda, daughter of Gains and Lucretia Brewer, of Wilbraham, survived him until May 2, 1872, when she died at the age of eighty-four years.

MANILLA ROPE AS STOCK.

Its Use Was Patented on December 4, 1843.

Lyman Hollingsworth, of South Braintree, Mass., one of the founders of the present Hollingsworth & Whitney Company, is credited with being the discoverer of the fact that manilla rope could be used successfully as stock for the manufacture of paper. After the panic of 1837 there were several years of business depression, and Mr. Hollingsworth found himself without stock or the money with which to buy it. From the hemp sails or canvas he had for some time cut the manilla bolt ropes and piled them outside of his mill, considering them of no value. In his emergency he took these manilla ropes, cut them up with

ZENAS CRANE.

axes and worked some of it into paper, and surprised even himself by finding that the product was a fine, strong manilla sheet.

In order to protect himself in the use of the new stock, he took out a patent, it being numbered 3362, and being granted on December 4, 1843. This patent reads as follows:

Be it known that we, John M. Hollingsworth and Lyman Hollingsworth, both of Boston, in the county of Suffolk and State of Massachusetts, copartners under the firm name of J. M. & L. Hollingsworth, have invented a new and useful manufacture of paper; and we do hereby declare that the following is a full and exact description:

The nature of our invention consists in making an exceedingly firm, smooth, and strong paper from the substance generally known as "Manilla Grass," being the fibrous portion of the bark of the wild banana (Musa textilis). We make use mostly of the old junk of what is termed in navigation "grass rope," cutting and picking it, as is usual with other kinds of paper stock. We then buck or boil it with water in a large kettle, adding lime in the proportion of one barrel to thirty-five hundredweight of stock. We continue the boiling for about twenty-four hours, or until the cohesion of the fibres is destroyed. We then put the stock thus prepared into the engine, and after washing it from one to four hours, according to circumstances, beat it about four hours. The pulp thus prepared we manufacture into paper in any of the usual modes. Instead of lime we sometimes use potash, soda-ash, or other alkaline substances of like properties.

We claim to be the first discoverers of the fact that the gummy, resinous, or other matters which bind together the fibres of the substances known as "Manilla Grass" may be so dissolved by the process of boiling in an alkaline lye that the fibres will become separated, and a material produced capable of being manufactured into paper of the best description.

We do not claim the process herein described as applied to any other materials; neither do we claim the employment, in conjunction with other stock, of a portion of manilla grass reduced to a state of minute division by mechanical means alone.

We consequently claim as our invention, and desire to secure by letters patent:

The application of the chemical process of boiling in caustic alkaline lye, substantially in the manner herein set forth, of the vegetable substance known as "Manilla Grass," for the purpose of preparing the same to be converted into paper.

The facts herewith presented were obtained from a pamphlet published by the Hollingsworth & Whitney Company, as are also the following quotations on manilla paper: 1865, 15 cents; 1870, 10 to 12 cents; 1880, 7 to 8 cents; 1885, 6 to 6½ cents; 1890, 5½ to 6 cents; 1893, 5¼ to 5¾ cents.

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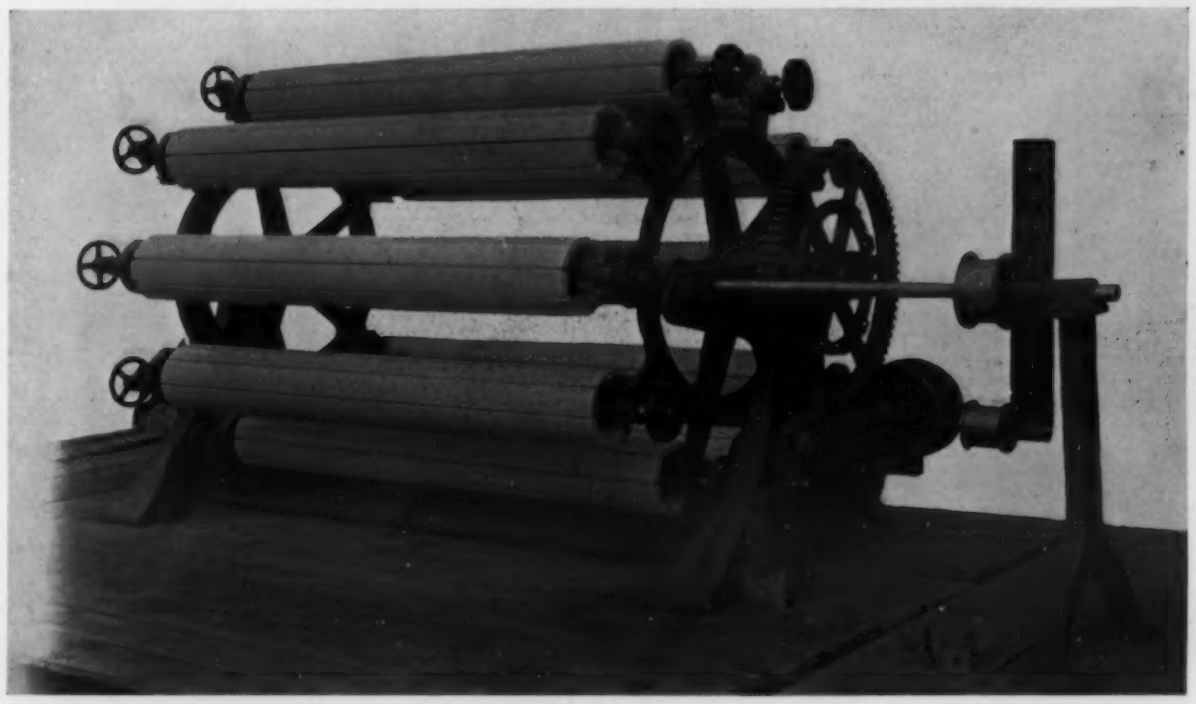

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Aroma Paper Co., Kankakee, Ill.
Atlantic Paper Co, Savannah, Ga.
Appleton Paper & Pulp Co., Appleton, Wis.
Adirondack Pulp Co., Warrensburgh, N. Y.
Atlas Paper Co., Appleton, Wis.
Albany Paper Co., Albany, Ind.
American Indurated Fibre Co., Portland, Me.
American Pulp Co., Appleton, Wis.
American Straw Board Co., Chicago, Ill.
Allegan Paper Co., Allegan, Mich.
Anchor Mills Paper Co., Windsor Locks, Conn.
Armour Paper Co., Chatham, N. Y.
Bowdoin Paper Co., Brunswick, Me.
Bridgeport Paper Co., Bridgeport, Conn.
Belfast Paper Co., Belfast, Me.
Baldwinsville Paper Mill, Baldwinsville, N. Y.
Batavia Paper Mfg. Co., Batavia, Ill.
Bath Paper Co., Bath, S. C.
Beach, S. Y., Paper Co., Seymour, Conn.
Bennington Falls Pulp Co., Greenwich N. Y.
Bushong Paper Co., Reading, Penn.
Black & Clark Paper Co., Marseilles, Ill.
Bacon Paper Co., Delaware, N. J.
Brown, L. L., Paper Co., Adams, Mass.
Black Hawk Paper Co., Milan, Ill.
Black River Paper Co., Brownville, N. Y.
Badger Paper Co., Kaukauna, Wis.
Bardeen Paper Co., Otsego, Mich.
Bayless Paper Co., Binghamton, N. Y.
Belden Falls Pulp Co., Middlebury, Vt.
Benfield, J. M., Mexico, Mex.
Beebe & Holbrook Co., Holyoke, Mass.
Berlin Falls Fibre Co., Berlin Falls, N. Y.
Beveridge Paper Co., Indianapolis, Ind.
Bird, F. W. & Son, East Walpole, Mass.
Bottsford Paper Mill, Kalamazoo, Mich.
Burgess Sulphite Fibre Co, Berlin Falls, N. Y.
Crocker Mfg. Co., Holyoke, Mass.
Conneaut Paper Co., Conneaut, Ohio.
Cleveland Paper Co., Cleveland, Ohio.
Crown Paper Co., Willimantic, Conn.
Contoocook Valley Paper Co., W. Henniker, N. H.
Chaplin Paper Co., Greenville, Conn.
Canal Paper Co., Windsor Locks, Conn.
Cowles Paper Co., Unionville, Conn.
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Claflin Paper Co., South Toledo, Ohio.
Clarksville Paper Co., Clarksville, Mo.
Colebrook Paper Co., Colebrook, Conn.
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Cumberland Paper Co., Cumberland, Md.
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Columbia Straw Paper Co., Logansport, Ind.
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Excelsior Fibre Co., Manchester, N. H
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Franklin Paper Co, Franklin, Ohio.
Friend & Fox Paper Co, Wyoming, Ohio.
Franklin Falls Pulp Co., Franklin, N. H.
Forest Fibre Co., Berlin Falls, N. H.
Fitch Bros. Pulp Co, Moore's, N. Y.
Fairchild Paper Co., East Pepperell, Mass.
Forest Paper Co., Yarmouth, Me.
Fall Mountain Paper Co., Bellows Falls, Vt.
Franklin Paper Co., Holyoke, Mass.
Friend, George H., Lockland, Ohio.
Fibre Ware Co., Portland, Me.
Fort Madison Paper Co., Fort Madison, Iowa.
Friend & Forgy Paper Co., Franklin, Ohio.
Frambach Paper Co., Kaukauna, Wis.
Fairfield Paper Co., Fairfield, Mass.
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Fandango Mills, Milburn, N. J.
Fitchburg Paper Co., Fitchburg, Mass.
Fisk Paper Co., Hinsdale, N. H.
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Marion Pulp Co., Marion, Ind.
Maritime Chemical Co., Chatham, N. B.
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Middletown Paper Co., Middletown, Ohio.
Mittineaque Paper Co., Mittineaque, Mass.
Midland Paper Co., Vandalia, Ill.
Mottville Paper Co., Mottville, N. Y.
Moore, John T. & Son, Bellows Falls, Vt.
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Norway Paper Co., Norway, Me.
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Presumpscot Pulp Ware Co., Portland Me.
Parkersburg Chem. Fibre Co., Parkersburg, W. Va.
Palmyra Paper Mills, Palmyra, Mich.
Pioneer Paper Mfg. Co., Athens, Ga.
Penn. Pulp and Paper Co., Lock Haven, Penn.
Page Paper Co., Old Furnace, Mass.
Philmont Paper Co., Philmont, N. Y.
Passumpsic Pulp Co., Lebanon, N. H.
Penobscot Chem. Fibre Co., Great Works, Me.
Penobscot Pulp & Paper Co., Bangor, Me.
Patten Paper Co., Appleton, Wis.
Perrine Paper Co., Franklin, Ohio.
Pettebone-Cataract Paper Co., Niagara Falls, N. Y.
Pejepscot Paper Co., Brunswick, Me.
Piscataquis Falls Pulp & Paper Co., Montague, Me.
Piedmont Pulp & Paper Co., Piedmont, W. Va.
Portage Straw Board Co., Circleville, Ohio.
Poland Paper Co., Gilbertville, Me.
Potomac Paper Co., Cumberland, Md.
Potomac Pulp Co., Conowingo, Md.
Phœnix Toilet Paper Co., Phœnix, N. Y.
Quincy Paper Co., Quincy, Ill.
Riverside Paper Co., Holyoke, Mass.
Reade Paper Co, Lisbon, Conn.
Rochester Paper Co., Rochester, N. Y.
Russell Paper Co., Lawrence, Mass.
Rockdale Paper Mills, Conyers, Ga.
Reed Paper Co., Baltic, Conn.
Record, Alvin, Livermore Falls, Me.
Rock Island Paper Co., Milan, Ill.
Richmond Paper Co., Providence, R. I.
Robertson, John, & Son, Bellows Falls, Vt.
Richardson Paper Co., Monroe, Mich.
Ramage, James, Paper Co., Monroe Bridge, Mass.
Reese Pulp Co., Kaukauna, Wis.
Reading Paper Mills, Reading, Penn.
Richards Paper Co., Gardiner, Me.
Rolland Paper Co., Montreal, Que.
Royal Pulp and Paper Co., East Angus, Que.
Rumford Falls Paper Co., Rumford Falls, Me.
Silver Spring Paper Co., Bloomfield, N. J.
Shiawassee Paper Co., Vernon, Mich.
Stewart Paper Co., Brookville, Ind.
Seymour Paper Co., Windsor Locks, Conn.
Smith Paper Co., Lee, Mass.
Southworth Paper Co., Mittineaque, Mass.
Stark Paper Co., North Bennington, Vt.
Saratoga Paper Co., Mechanicsville, N. Y.
Sebago Wood Board Co., South Windham, Me.
Syms & Dudley Paper Co., Holyoke, Mass.
South Bend Paper Co., South Bend, Ind.
Seaside Paper Co., Bridgeport, Conn.
Springdale Paper Co., Westfield, Mass.
Scioto Straw Board Co., Kenton, Ohio.
Southwestern Paper Co., Lawrence, Kansas.
Somerset Fibre Co., Waterville, Me.
Salisbury & Vinton Paper Co., Indianapolis, Ind.
Skaneateles Paper Co., Skaneateles, N. Y.
Saranac River Pulp & Paper Co., Cadyville, N. Y.
Sauquoit Paper Co., Sauquoit, N. Y.
Singerly Pulp & Paper Co., Philadelphia, Penn.
Scioto Pulp & Paper Co., Chillicothe, Ohio.
Stone Fort Paper Co., Manchester, Tenn.
Stoddard Paper Co., New London, Conn.
Sugar River Paper Co., Claremont, N. H.
Turner's Falls Paper Co., Turner's Falls, Mass.
Todd, Milo A., Wallingford, Conn.
Tangeman, Geo. P., & Co., Hamilton, Ohio.
Tytus Paper Co., Middletown, Ohio.
Topsham Paper Co., Brunswick, Me.
Tippecanoe Paper Co., Monticello, Ind.
Tama Paper Co., Tama City, Iowa.
Talbot Paper Mills, Easton, Md.
Tissue Paper Co., Elkhart, Ind.
Tangeman, John H, & Co., Lockland, Ohio.
Ticonderoga Pulp & Paper Co., Ticonderoga, N. Y.
Three Rivers Paper Co., Three Rivers, Mich.
Terre Haute Paper Co., Terre Haute, Ind.
Tilden Paper Co., Brownville, N. Y.
Thilmany Pulp & Paper Co., Kaukauna, Wis.
Twin City Paper Co., Baltimore, Ohio.
Toronto Paper Co., Cornwall, Ont.
Tompkins Paper Stock Co., Brainard, N. Y.
Union Paper Co., Holyoke, Mass.
Umbagog Fibre Co., Livermore Falls, Me.
Union Mills Paper Mfg. Co., Lambertville, N. J.
Union Pulp Co., Kaukauna, Wis.
United Indurated Fibre Co., Lockport, N. Y.
United Indurated Fibre Co., Portland, Me.
Valley Paper Co., Pittsburg, Penn.
Vernon Bros., 67 Duane Street, New York.
Vermont Fibre Co., Bennington, Vt.
Valley Paper and Pulp Co., Appleton, Wis.
Valparaiso Paper Co, Valparaiso, Ind.
Valley Paper Co., Holyoke, Mass.
Valley Falls Paper Mfg. Co., Valley Falls, N. Y.
Vulcanized Fibre Co., 17 Dey Street, New York.
Van Nortwick Paper Co., Batavia, Ill.
Vandalia Paper Co., Vandalia, Ill.
Van Wyck Paper Co., Mellenville, N. Y.
Victoria Paper Mill, Fulton, N. Y.
Walker, F. R., Burnside, Conn.
Wheelwright, Geo. W., & Sons, Fitchburg, Mass.
Worthington, John, Cooperstown, N. Y.
Winchester Paper Co., Winchester, Va.
Winnipiseogee Paper Co., Franklin, N. H.
Wilkinson Bros. & Co., Birmingham, Conn.
Worthy Paper Co., Mittineaque, Mass.
Wauregan Paper Co., Holyoke, Mass.
Whiting Paper Co., Holyoke, Mass.
Walloomsac Paper Co., Walloomsac, N. Y.
Weston, Byron, Dalton, Mass.
West. George, Ballston Spa, N. Y.
Woodruff Paper Co., Dansville, N. Y.
Weeks, F. G., Skaneateles, N. Y.
Weymouth Paper Co., Bloomfield, N. J.
Winona Paper Co., Holyoke, Mass.
Waldron Paper Mills Co., Waldron, Ill.
Waverly Paper Co., Waverly, N. Y.
Warrensburg Pulp Co., Warrensburg, N. Y.
Woodsdale Paper Co., Woodsdale, Ohio.
Warren, S. D., & Co, East Pepperell, Mass
Weed Paper Co., Malone, N. Y.
West Ware Paper Co., Springfield, Mass.
Waddington Paper Mill, Ogdensburg, N. Y.
Winnebago Paper Mill, Neenah, Wis.
West Virginia Fibre Co., Parkersburg, W. Va.
Wardlow-Thomas Paper Co, Middletown, Ohio.
Wanaque River Paper Co., Wanaque, N. J.
Wabash Paper Co., Wabash, Ind.
West Toledo Paper Co, Toledo, Ohio.
West Virginia Paper Co., Piedmont, W. Va.
West Virginia Pulp Co., Davis, W. Va.
Westmoreland Paper Co., West Newton, Penn.
Wellsboro Paper Co, Stokesdale, Penn.
Webster Paper Co., Orono, Me.
White Mt. Pulp & Paper Co, Berlin Falls, N. H.
Wisconsin Sulphite Fibre Co., Monico, Wis.
Whitman Paper Mills, Dansville, N. Y.
Wilmington Paper Co., Wilmington, Ill.
Willamette Pulp & Paper Co., Oregon City, Oregon.
Xenia Paper Co., Xenia, Ohio.

FIG.
FIG.
FIG.

MORRIS MACHINE WORKS,

BALDWINSVILLE, N. Y., U. S. A.

Formerly HEALD, SISCO & CO. ESTABLISHED 1864.

and HEALD & MORRIS. INCORPORATED 1892.

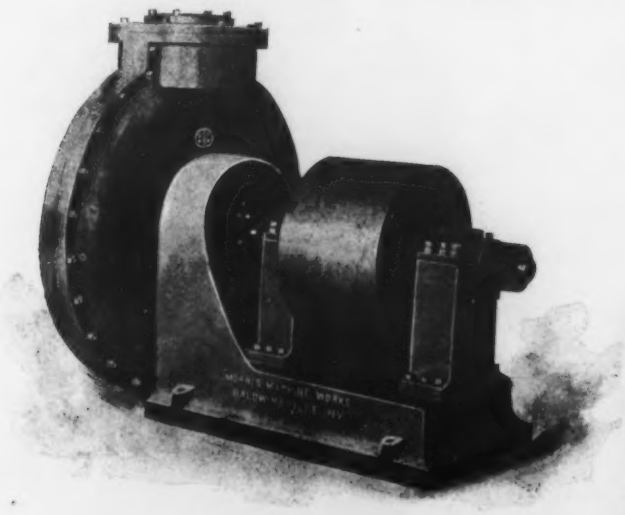


FIG. 2.

Fig. 18.

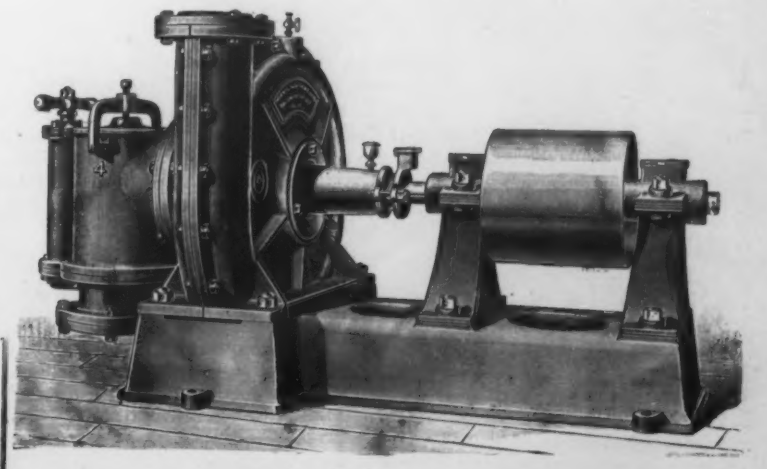


Fig. 17.

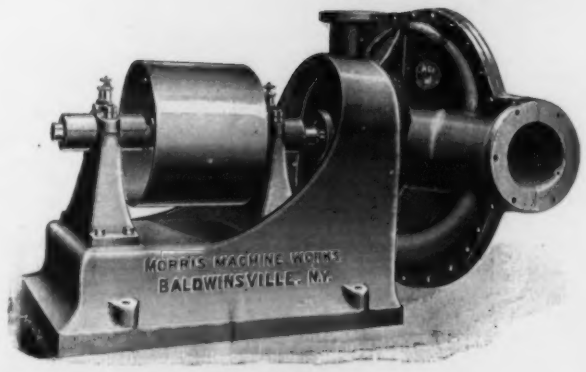


Fig. 14.

Fig. 6.

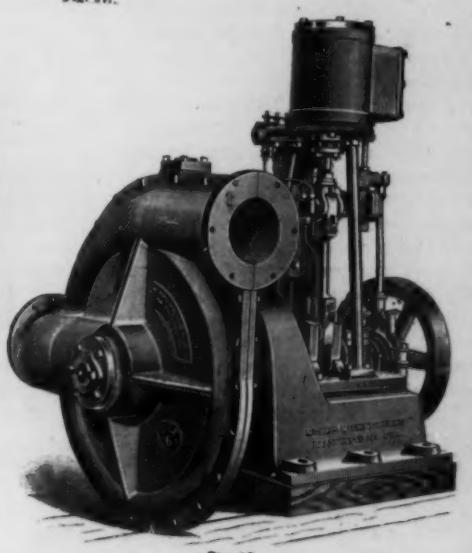


Fig. 12.

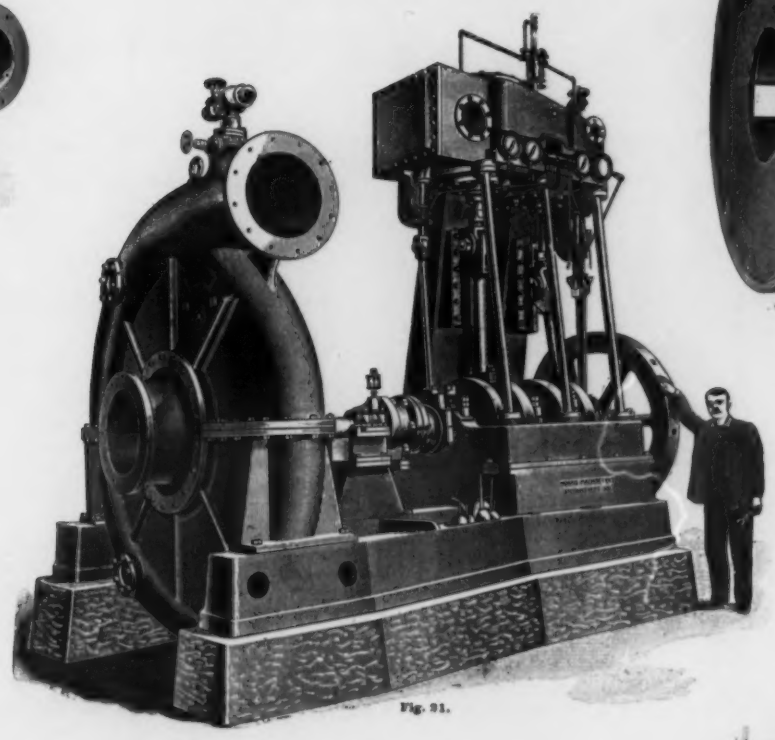


Fig. 21.

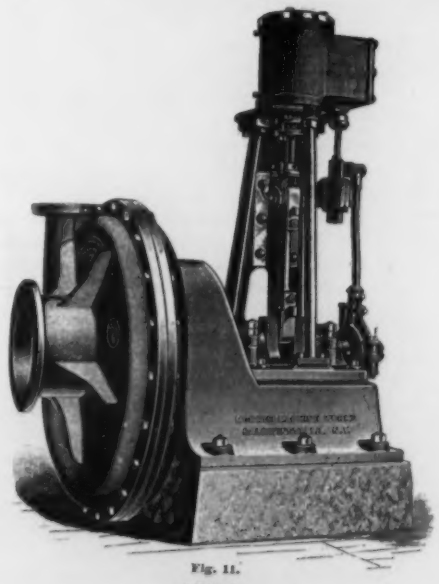


Fig. 11.

Fig. 1.

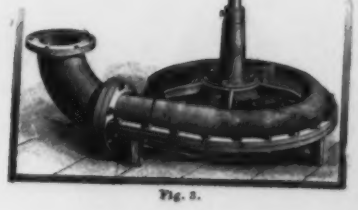


Fig. 3.

Fig. 9

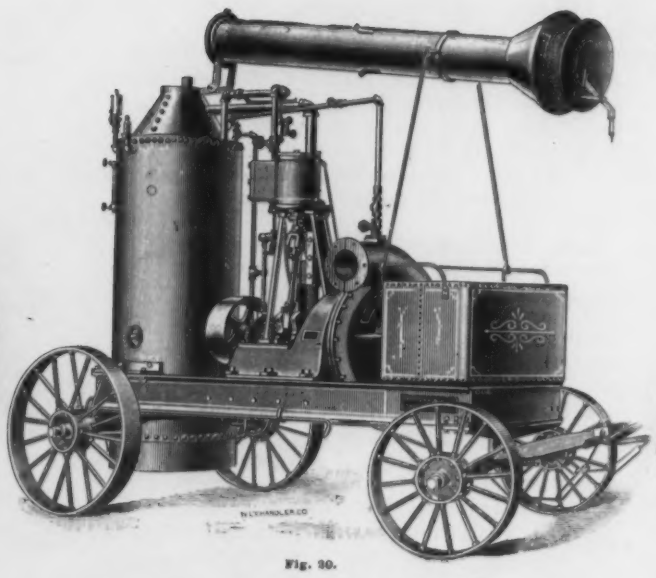


Fig. 20.

Fig. 19.

On this page we illustrate several of the popular styles of centrifugal pumps which we are making at the present time.

FIG. 2 is our newest design of pump for Paper and Pulp Mills.

FIG. 17 is our Standard and most popular style.

FIG. 14 is our Double Suction Pump.

FIG. 19 is designed for raising sand, gravel and other solids.

FIGS. 9, 11, 12 and 18 are directly connected Steam Pumps for various uses.

FIG. 21 is a special Sewage Pumping Outfit.

FIG. 3 is intended to be submerged in the liquid to be raised.

FINE PAPERS FROM WOOD.

THE PROGRESS MADE IN THE PROPER USE OF THE MATERIAL.

The Course of Prices in Paper—The Use of Soda Fibre in Paper in the Early Days—A Profitable Rag Transaction—Paper Mills Forty Years Ago and To-Day—Wood Paper for Lithographic Work.

By THOMAS DUNCAN.

BOUT ten days ago a gentleman interested in the manufacture of paper said to me that he supposed that since I became actively engaged in paper manufacturing the tendency of prices must have been continually downward. Probably many others have the same idea. But looking back over forty-two years I find that book papers were being sold then at from 9 to 12 cents a pound. At that time they were made of all rag. The price did not vary much until after the commencement of the war, when trade seemed to be subject somewhat to war conditions.

In the fall and winter of 1857–8 there was great depression in the paper business, said to be caused by the change in the tariff. I was so young then that I did not give much heed to that, although I was one of the sufferers, being able to work only part time. The claim is made to-day that the recent general dullness in the country, and also the special dullness in the paper trade, was from the same cause.

Some time from 1860 to 1862–3 some parties began the manufacture of soda fibre in the neighborhood of Philadelphia and Wilmington, Del. Notices were sent around to many of the paper manufacturers and newspapers inviting the press as well as the manufacturers to visit the soda-fibre works; afterward the papers came out with articles stating how very much cheaper paper was going to be by reason of the establishment of the soda-fibre mills. Manufacturers and others talked freely of the foolishness of these parties in acting as they did, the general expression being that if these people had the means of producing paper stock at a very much lower price than heretofore they would better endeavor to get some of the reward for themselves. Business wisdom and prudence should have led them to do very differently from what they did.

However, lower prices did not follow; instead, prices advanced, not from the fact that soda fibre was being manufactured, but as a result of the war, and they continued to advance until about 1866–7, when book papers brought from 27 to 35 cents per pound, and in some of such papers a small quantity of soda fibre was used.

The writer was at that time superintendent of the Peter Adams mill at Buckland, Conn. That mill had a 66-inch Fourdrinier machine, and in 1865 it was considered doing good work if it averaged 3,500 pounds per day; in 1866 that machine averaged 4,500 pounds per day, and the stock principally used was Fabricotti and Catania linens, the price of which was about 9 cents a pound, with cottons correspondingly high, about 5 per cent. of soda fibre being worked in with them. Labor then was lower than to-day, as a machine tender's pay was considered good at $14 a week; it is now $18. Not many pounds of paper were made, but the profit per pound was very much greater than the price paid for paper to-day for equally as good paper. The working qualities of the paper of to-day are superior to the paper made at that time with the materials as above.

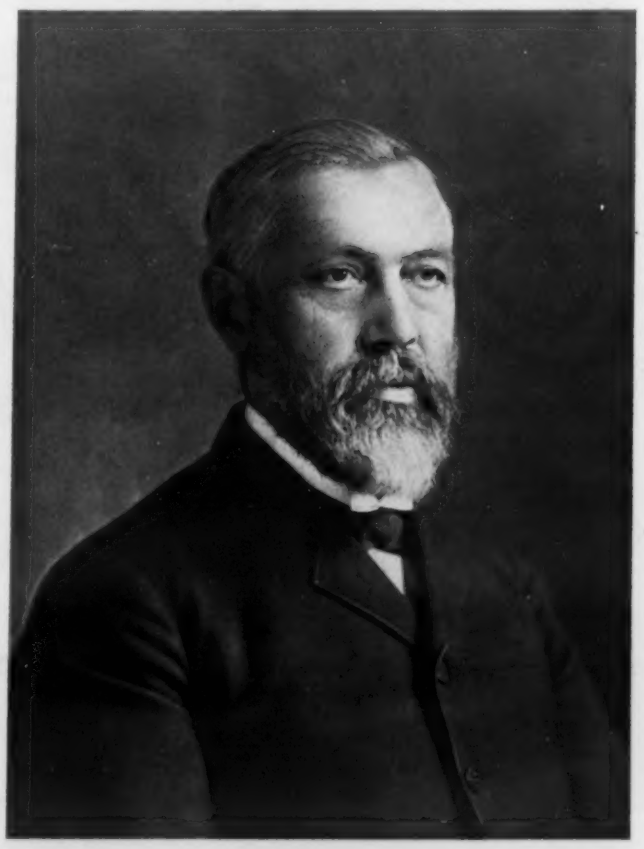
The way we came to have soda fibre was this: A mill in the neighborhood of Mr. Adams's mills purchased a carload for use in its fine writing papers, but found that, owing to the low color of the fibre and for other reasons, it would be undesirable for them to use it, and so the Buckland mill purchased it. After using that lot, Mr. Adams did not purchase any more for a number of years. This is where the writer first came to have a somewhat practical knowledge of soda fibre in fine book papers.

I might here mention, in speaking of the price of rags, that I very distinctly recollect that the Chelsea Company had purchased a considerable quantity of fine white rags, and, as I remember, at the price of about 10 cents a pound. When the cotton factories in the North could not get their supply of cotton from the South and were searching for some substitute, the Chelsea Company sold its fine white cotton rags for 25 cents a pound, thus being able to make very much more money out of that sale than it could possibly have made by converting them into paper.

The prices of paper did not long continue at the high figures named above, but slowly declined until the panic of 1873, when they went down very rapidly and continued very low until the boom of 1880, at which time prices for paper jumped right up. I know of one man who used to go to New York every two weeks advancing the price of paper half a cent a pound, and with so many orders being given him that he would have to go around the next morning advancing prices another half cent a pound. So, the statement of my friend that, in my experience, I must have witnessed a continual downward tendency in prices was not according to the facts. But the difference between the very high point of 35 cents a pound and the price of to-day, 4¼ cents, is greater than on any other manufactured product.

Contrasting the paper mills of to-day with those of forty years ago in the amount produced the increase is certainly tenfold. The Chelsea Company considered at that time that if it averaged 6 tons of paper per day from its six machines it was doing well, and yet three of those machines were 84 inches in width and three 62 inches. Four of them ran night and day and two days only, but running about fourteen to sixteen hours. Now a modern-built paper machine for book papers is expected to average at least 10 tons per day.

In 1880 to 1882 two, if not more, soda-fibre mills were started up, putting on the market from 30 to 35 tons of fibre per day.



THOMAS DUNCAN.

Since then they and other fibre manufacturers have had some strange experiences. It has been very tritely said by a Boston manufacturer that the figures which one man gave as the cost of fibre and the price he named which he could get for it were correct, only they should have been changed in their order, so that instead of fibre costing about 3 cents a pound and selling for 5 cents, they very soon found out that the fibre costs 5 cents a pound to make and sold for 3. "The figures were all right, only their order should have been changed." That gentleman was not the only one who has had that experience. Another manufacturer went to one of the largest warehouses in New York, and showed by figures that his company was making a net profit of over $8,000 a month, but, somehow, when the books were balanced at the end of the business year they showed a large deficit and continued so for a number of years.

There has been no branch of the paper industry that has suffered greater losses than the soda-fibre manufacturers, unless it is the sulphite fibre makers; and I think it has been truthfully said that of the many millions of dollars invested in the soda fibre industry, when deterioration of plants and the failure of some of the companies are considered, the entire capital, as a whole, has been literally wiped out, and yet some soda-fibre manufacturers have made a little money.

The writer's attention to sulphite fibres goes back about fourteen years. Traveling in Europe and visiting some paper mills, I first saw small quantities of sulphite fibre used in the making of paper, along with ground wood for news paper. I had seen the material before and read of it, but never saw it used until then. Shortly after that I learned of a gentleman making the statement in New York that he would give about two years to the soda-fibre manufacturers to close their works, as sulphite would soon replace soda fibre, for it could be manufactured at such a low cost. However, that gentleman and others who entered into the manufacture of sulphite have had a different experience. The soda-fibre mills are running yet, and are not losing any more money than the sulphite mills are.

About ten years ago parties in Pennsylvania erected a soda-fibre mill with a paper machine to convert part of their fibre into paper, which they did. I suppose others in Pennsylvania and possibly elsewhere were trying that same thing, but it was only a low grade of machine-finish book paper that was made and it came very little into competition with the other paper manufacturers who were using rags and soda fibre together in about equal quantities. Shortly after this, experiments began to be made with a mixture of sulphite and soda fibres and some parties soon erected a large plant to make fine machine-finish and super-calendered book papers from a mixture of sulphite and soda fibres in such proportions as their experience and the requirements of the paper trade would demand. They were of course pooh-poohed by manufacturers who were using both rags and soda fibre; printers were prejudiced about the use of such papers and a number of paper manufacturers endeavored to belittle the use of an all-wood paper for fine work. It was said, "Oh, it will not take good cuts;" "The paper will roughen all up;" "It would be rotten;" "It would not last over night." Although this policy succeeded for a time, yet by perseverance the manufacturers of an all-wood fine book paper succeeded by improvements in their papers in convincing the publishers of not only books and magazines, but also the lithographers, to the contrary. I have never yet heard of any person using a properly made all-wood paper for lithographic work who had any trouble with paper either shrinking or stretching, and there is reason for this. Take a paper made largely of rags, or a mixture of rags and fibres, and there seems to be no end to its stretching when it is being lithographed, unless that paper was beat up so fine that there was less strength to it than there would be to an all-wood paper. The main reason for this is that a wood paper when thoroughly super-calendered for such fine work has all the stretch taken out of it and the fibre is so set that there practically will be no stretch to it, and when it is for work on which many colors are to be used it registers even. In this I may be giving away some of the secrets and experiences that people have had in making such papers, but it may also let lithographers know the reason why wood papers give the good results they do.

The necessary requisite for an A 1 book paper is that the soda fibre shall be just enough cooked and bleached to meet the requirements without destroying the fibres more than is actually necessary. It is the same also with the cooking and bleaching of sulphite fibres. It is almost impossible to use either soda or sulphite fibres that have been forced in the cooking by a very high pressure of steam and strong alkali and acids. Using the minimum quantity of alkalies and acids with slow and long cooking, and properly beating the material in the beating and refining engines, produces the excellent all-wood papers which are being so freely put upon the market to-day.

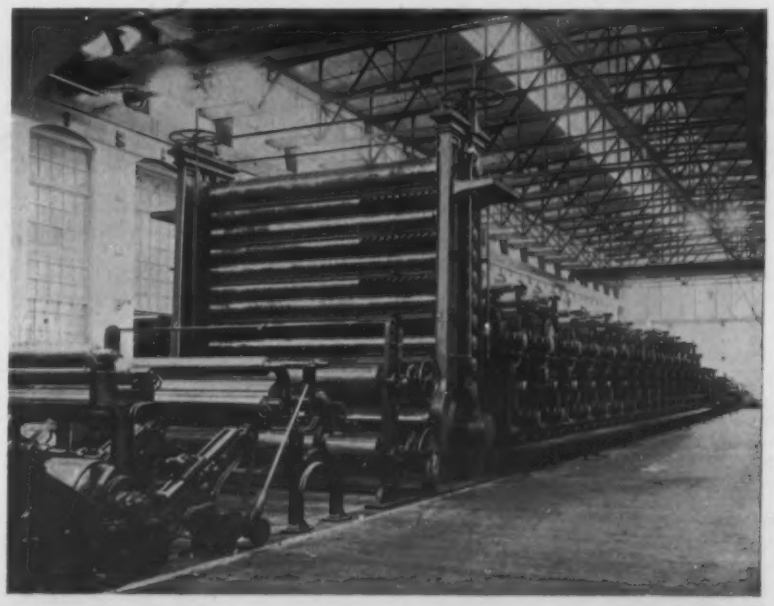
Endeavoring to make contrasts between the grades of papers of forty-two years ago and those of to-day is very difficult, for the reason that the requirements of the publishers of to-day are so much greater than formerly, and it is very doubtful if the all-rag papers made long ago could now take the place so acceptably filled by the all-wood papers of the present. The facilities and the art of making papers then were such that no attempt was made, or even required, to produce the surface, and so well-made paper, that the nice half-tone cuts of to-day require.

Bamboo and Guns.

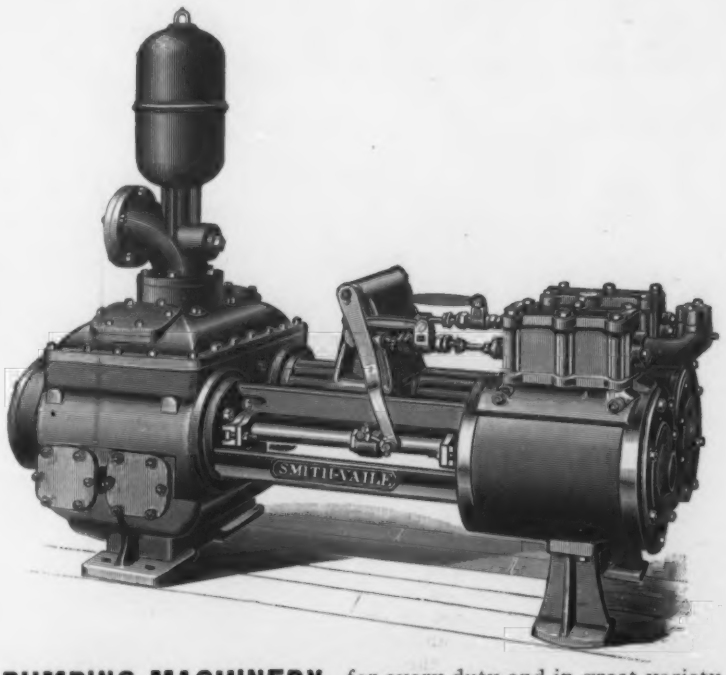
In 1863 a company was formed here to produce pulp for paper making from bamboo. The raw material was grown on the island of Jamaica. When the bamboo was landed here it was tied in bundles about 5 feet long, and was then soaked in water for about twenty-four hours. The bundles were then placed in large steam guns, each 24 feet long and 15 inches in diameter. Then the bamboo was subjected to a pressure of 180 pounds of steam, which reduced it to such a condition that when the steam guns were suddenly discharged, the bamboo was thrown out in a fibrous condition. It was then soaked in a solution of spent alkali, after which it was washed. It was next put in egg-boilers, so called from their similarity to the articles of domestic economy bearing that name, and in them it was boiled under pressure, after which it was boiled in other vessels in a strong alkali solutions under 90 pounds pressure. This process was used by the American Fibre Disintegrating Company at its works at Red Hook, Brooklyn, N. Y., where large sums of money were spent in experimenting with bamboo and cane, and also by a company which operated a mill at Bloomfield, N. J.

In 1857 House & Co., paper manufacturers at Haddam Neck, Conn., made experiments with ivory shavings, and produced a quantity of paper upon which a part of an edition of the Hartford *Courant* was printed. The paper, as might be supposed, was inferior to rag paper, but the manufacturers thought they could improve upon it. The fact was there was just enough of these shavings used to spoil the paper, as has been the case with so many new substances.

THE LARGEST FOURDRINIER IN THE WORLD—WET PART.



THE LARGEST FOURDRINIER IN THE WORLD—CALENDERS, DRYERS, ETC.



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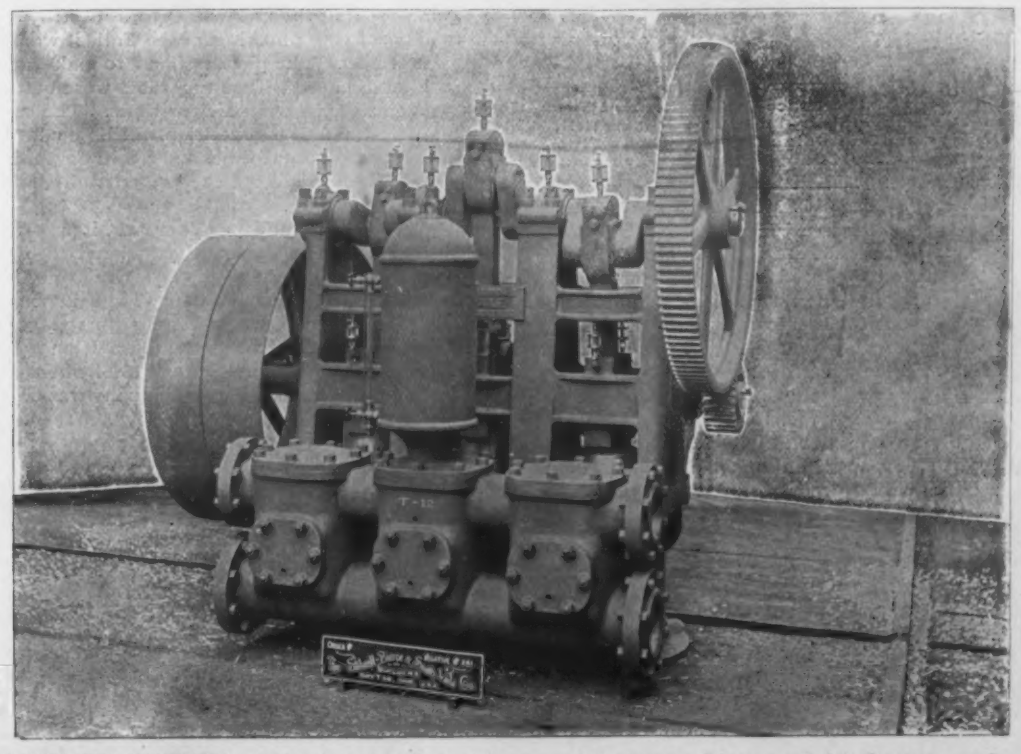

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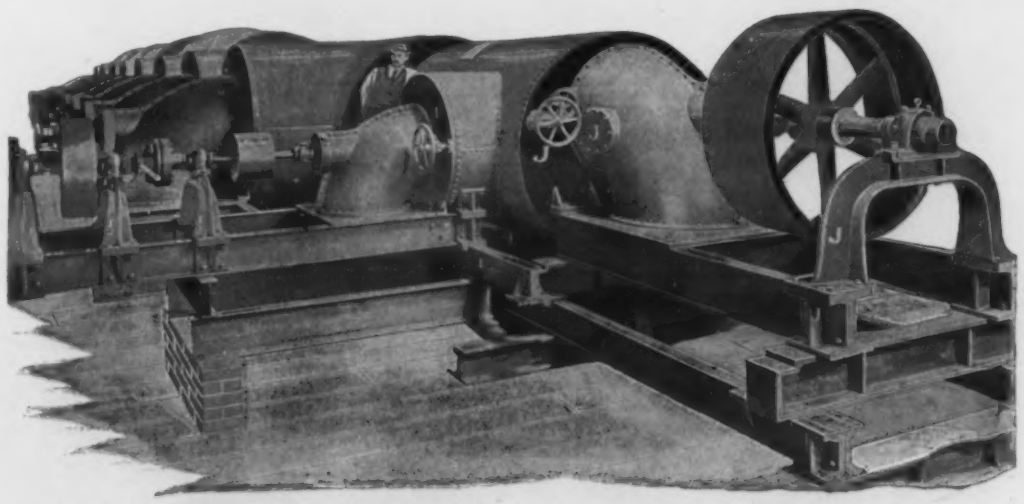

Engraving represents eight 33-inch, one 30-inch, and one 15-inch **Cylinder Gate Victor Turbines,** on horizontal shafts, supplied from one feeder pipe 13 feet in diameter at large end and reducing as Wheels are taken off. This outfit was furnished for the power plant of the Freydenburgh Falls Pulp Co., Plattsburgh, N. Y., developing 4,660 horse power.

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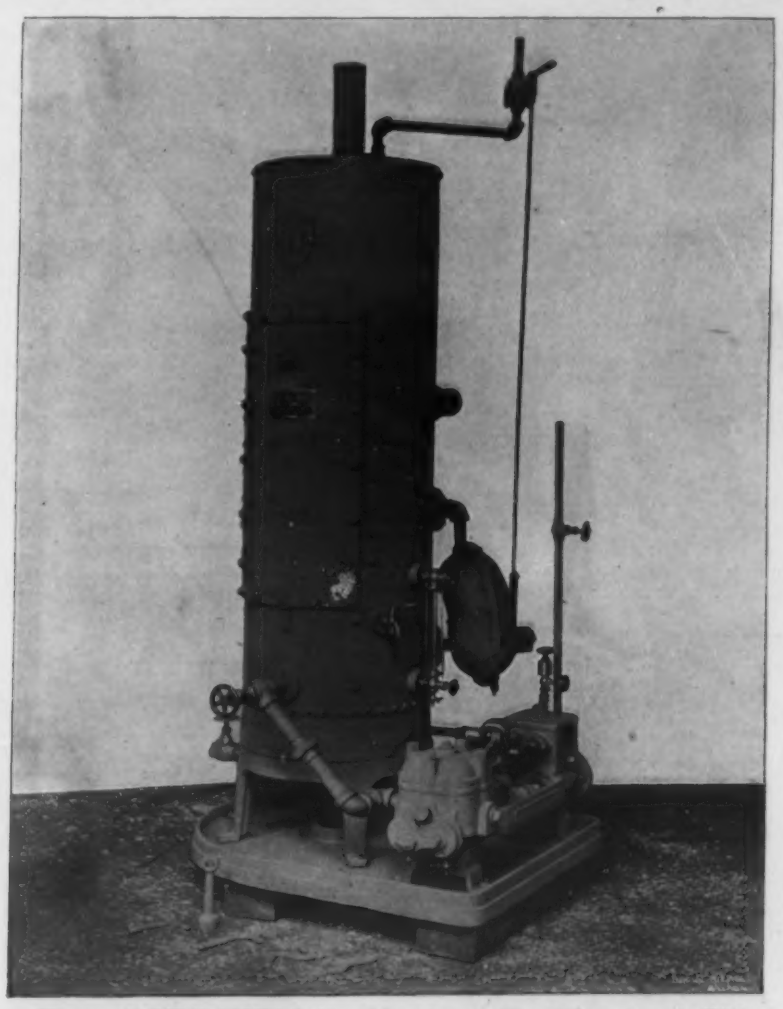

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NIAGARA FALLS.

ITS HISTORY AS A PAPER-MANUFACTURING CENTRE.

Nature's Endowment of the Place—Its Immense Power—How It Has Been Developed—The First Paper Mill, Which Was Located on Goat Island—The Present Fine Establishments and the Changes Which Have Made Them Possible.

By Col. J. C. MORGAN.

THERE is not the slightest doubt but that Nature has placed her hand upon Niagara Falls and designed that locality not only as a beautiful scenic resort but also as a power-producing and manufacturing centre. Particularly is the latter true as regards the paper and pulp making industries. This region fairly teems in historical interest in this respect. Probably no other locality in America marks so distinctly the growth of paper making and the development of water power in its varied processes. Here is prominently exemplified the progress made in paper-mill construction, from the little hand mill which, back in the 20s, was located on the river shore, in the rear of the present Cataract House, to the large and splendidly equipped plants run by steam and electricity which now dot the river bank above and below the American Falls. Here is best contrasted the means of shipment and distribution of product from the old-fashioned peddler's outfit with a limited stock, taking many days to cover a circumscribed territory, to the carload lots transported hundreds of miles in a single day by fast freight lines. Here are shown by rapid steps the changes in power development, from the crude means adopted of generating power on the rapids under a low head, with the disadvantages of low water, ice and other obstacles, to the finely constructed modern power plants of the present day, developing power under heads averaging 180 feet, showing that the mechanical mind is ever alert, and that the best results of the best brains of the engineers of modern times have been secured for this manufacturing city. Here has been shown the latest development of the use of electricity in paper making. Machines are run with the greatest success by this wonderful power, and the electrical bleaching process of preparing pulp has reached its highest stage.

Here are found the most advantageous facilities for disposing of product by the various rail and water transportation lines. The facilities which dispose of product also bring the raw material, and what one hand passes in the other takes away.

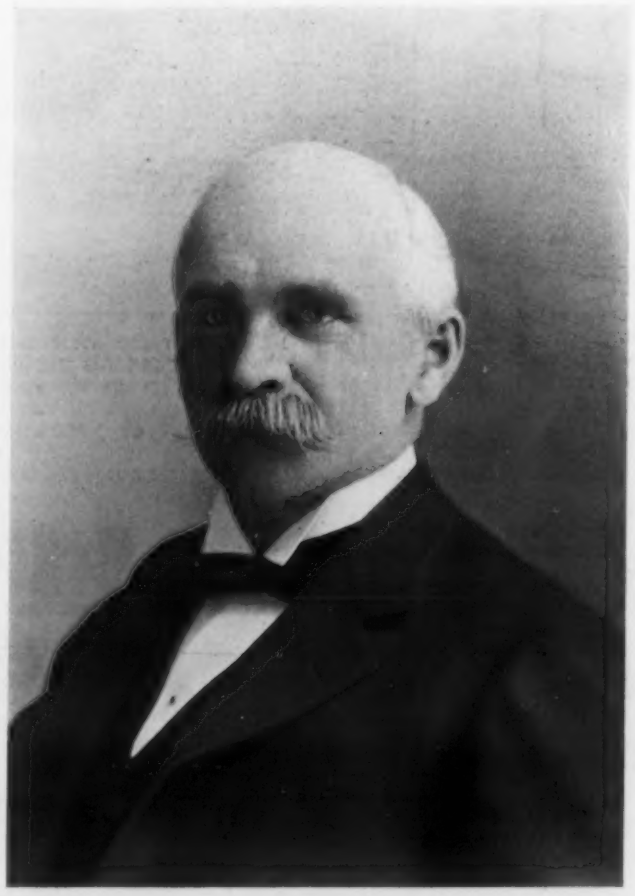
Having thus shown that Niagara Falls is naturally endowed as a paper-making location, it is befitting to review briefly the history of this industry from its inception to the present time. The prodigious strides made in seventy-five years of paper making at the Falls are best told by repeating the stories related by sons of fathers whose pioneer struggles laid the foundation for some of the prosperous mills of the present day.

It was 'way back in 1823 that the first stone for the foundation of the first paper mill at the Falls was laid. Jesse Symonds, a Connecticut man of varied experiences in the paper-trade world, came to Niagara and began the erection of a paper mill on the main shore, just above the bridge crossing to Goat Island and back of the present Cataract House.

The water for power was taken from the river just above the present site of the Cataract House, the right having been purchased from Judge Augustus Porter and General Peter B. Porter. Mr. Symonds died before the mill was completed, but his wife continued the work and leased the mill to Henry W. Clark, of Rochester, N. Y., for three years. Clark made printletter and wrapping paper by hand, and found his customers in the surrounding towns and country. His men drove from place to place buying rags and selling paper. When Clark's lease of the Symonds mill had expired he entered into partnership with Albert H. Porter, the second son of Judge Porter, and together they purchased from Judge Porter and General Peter B. Porter a mill site on Bath Island with water privileges. They operated the mill successfully for a number of years by the old hand methods. Paper was then made by what was called the "dip process," but in 1835, after the Fourdrinier machine had been introduced, Mr. Porter visited the mills where machines were and ordered a machine. This was set up and run by Charles H. Symonds, the son of the pioneer mill builder of Niagara. The site on Bath Island was chosen in order to obtain clear water for the linen, ledger, news and writing paper, while wrapping paper was made during the periods of muddy water.

In 1840 Clark sold out his interest to Porter, who at this time was making paper for the old Buffalo *Express* and the New York *Tribune*. Porter in turn sold to Bradley Brothers, and after a few years L. C. Woodruff, of Buffalo, became the owner, and he also rebuilt the mill when it was destroyed by fire. In the early days of paper making at the Falls it was not the smooth sailing it is now. The pioneers had to make a little of almost every kind of paper. True the prices were better, and it is said that even 29 cents was paid for news. The market was limited and there was less competition. Mills could not run on specialties as at the present time, and a mill devoted wholly to the production of news, as are the present mills at the Falls, was an unheard-of thing.

To return to history, however, it was in 1852 that the Pettibone name first became associated with paper-making at Niagara Falls. In that year Stoughton Pettibone, father of Major L. B. Pettibone, whose name and interests are perpetuated in the Pettibone-Cataract Paper Company, purchased an interest with Mr. Woodruff in the Bath Island plant, and Woodruff & Pettibone continued it until 1883, when the firm was dissolved, and the Pettibone Paper Company was organized with Stoughton



Col. J. C. Morgan.

Pettibone, Major L. B. Pettibone, John Quigley and others as the stockholders and officers. It was at this time that the movement was set on foot to acquire the islands and shore property above the falls as a State reservation. The Pettibone Paper Company abandoned the old plant on Bath Island, for which the State paid it a good sum, and in 1884 built the mill on the present site on the hydraulic canal. In October, 1892, the Pettibone and Cataract Manufacturing companies consolidated and formed what is now known as the Pettibone-Cataract Paper Company.

The plant of the Cataract Manufacturing Company consisted of a pulp mill on the river bank and was owned by C. B. Gaskill, John J. MacIntire, and others. This mill, known as Gaskill's pulp mill, was built several years previous, ostensibly to furnish pulp to the local mills. The first pulp mill was built and operated by Hill & Murray. This mill was located on the old hydraulic race on the river bank back of the present International Hotel. The mill was taken away when the State took the property for a reservation in 1885. In those old days the pulp was made by the old process of burr stones.

Another early mill was that of Allan & Jones, which was located on the river bank where the present old Niagara Wood Paper Company's plant is. In 1880 the latter company was formed, and the machinery for making boards was added, with Walter Jones as manager.

John F. Quigley was one of the first to recognize the advantages of the Falls as a pulp-making point. He built a pulp mill on the river bank, where the present Cliff Paper Mill is now located, in 1877. The mill made about 4 tons a day, and, to be more accurate, was the same building which is now used as a shipping room by the Cliff Paper Company. Mr. Quigley ran this mill until 1888, when the paper mill was added. It was then that Arthur C. Hastings, who came of a noted paper-making family, moved to Niagara Falls from Rochester. Mr. Hastings contracted to build the paper mill for Mr. Quigley and was afterwards engaged as manager of the plant. Mr. Hastings conducted both pulp and paper mill with marked success. In 1892 Mr. Quigley sold his plant, known as the Cliff Paper Company, to J. F. Schoellkopf, Arthur Schoellkopf, Henry Grigg, W. D. Olmsted, George B. Mathews and Arthur C. Hastings. The new company in 1893 built the present pulp mill below the bank, which has a capacity of 35 tons. The present mill is equipped with two paper machines, operated by electricity.

Another trade industry which is evidence of the advantages of Niagara Falls for developing a prosperous business is that of the Niagara Glazed Paper Company. It was incorporated early in 1891, and its promoters were Henry M. Robertson, of New York; C. B. Gaskill, David Phillips, Otis Phillips and Henry Durk, of Niagara Falls. The capital stock was $15,000. Glazed and lithographic paper, label, coated and box boards were the principal product. The company existed until December, 1896, when the Niagara Surface Coating Company was formed and purchased the plant. The directors are John C. Tammerts, Eugene Cary and Frank H. Innes. The former gentleman owns the majority of the stock and controls the company.

In speaking of the Niagara Falls Paper Company, the largest and the latest achievement in this industry at Niagara Falls, the writer will simply dwell on plain facts. This company was organized in 1891 by Lewis A. Hall, J. L. Norton, D. O. Mills, myself and others. Niagara Falls was selected for the plant, owing to the unfailing water power and its location as a receiving and distributing centre for product. The plant, which is pronounced by competent critics one of the most complete in the world, was commenced in 1892. The company developed its own water power, its own wheels, and has now 7,200 water horse-power and 2,300 steam horse-power. The mill is equipped with one 136-inch machine and five 120-inch machines for manufacturing news. The total tonnage is 125 tons of news per day. In addition there is a complete sulphite mill with a capacity of 40 tons, and a ground-wood mill with an output of 90 tons. The company has its own timber preserves in Michigan and owns a fleet of sixteen boats, headed by the new modern freight lake propeller "Niagara," which are used to bring down the pulp wood, which is then stored in the boom yards on Grand Island. It was the aim of the management of this company to establish a superior grade of news from the very inception. The very best machinery was provided and skilled paper makers were secured. It is a source of pleasure therefore to the company to know that with advantages of wood, water and machinery, the print paper turned out has earned a high reputation in the market, not only at home but also in competition with foreign trade.

In regard to the progress made by the mills at Niagara Falls seeking foreign markets for their product, it is gratifying to note that the more Niagara print paper is seen and tried the more orders are secured. Good water, plenty of it every day in the 365, is one of the reasons why Niagara paper can be relied upon for uniformity of color and quality. Foreigners come here to view the great water spectacle, and it has come about that power development and paper making are taking rank side by side with the water show. Not to have seen the power houses and the paper mills is now considered by visitors as not to have seen Niagara properly, and so these visits of foreigners have also served to advertise Niagara's paper-making plants.

The principal features in the commercial world which make this city the best of its kind in this country as a manufacturing point are the unsurpassed facilities for securing raw material cheaply, such as coal, wood and ores. Then as a distributing centre it cannot be excelled. Here are almost a dozen railroads passing through, insuring the prompt, safe and rapid delivery of goods. Transportation is not dependent upon one or two, or even three, lines, but many rail routes are available, while the Erie Canal and the great lakes are also at the gates. These secure advantageous freight rates, and relieve shippers of the annoyance of delay by accident. No tariff tinkers of either Canada or the United States can interfere with or affect the pulp and paper mills of Niagara. If Canada imposes an export duty on spruce it is only necessary to turn to the spruce belt of Michigan, where much of the pulp wood which now comes to the Falls is secured. With cheap raw material, continuous power, and reasonable freight rates, there is no reason why the paper mills of Niagara Falls cannot compete with the world as to product and price.

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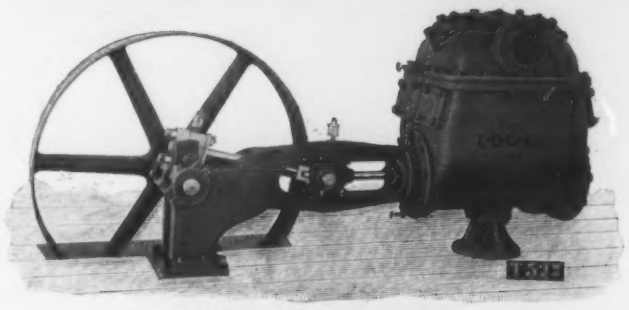
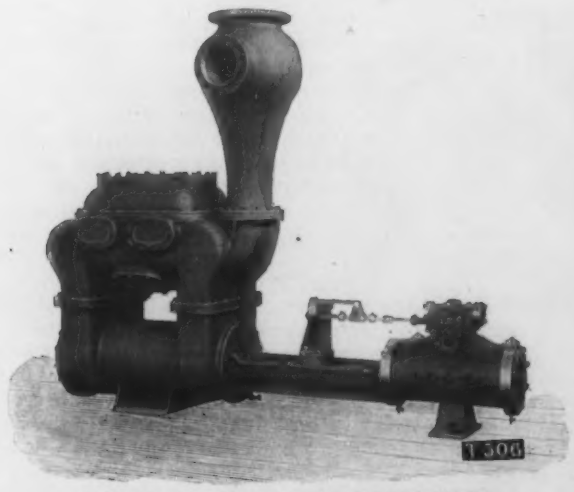
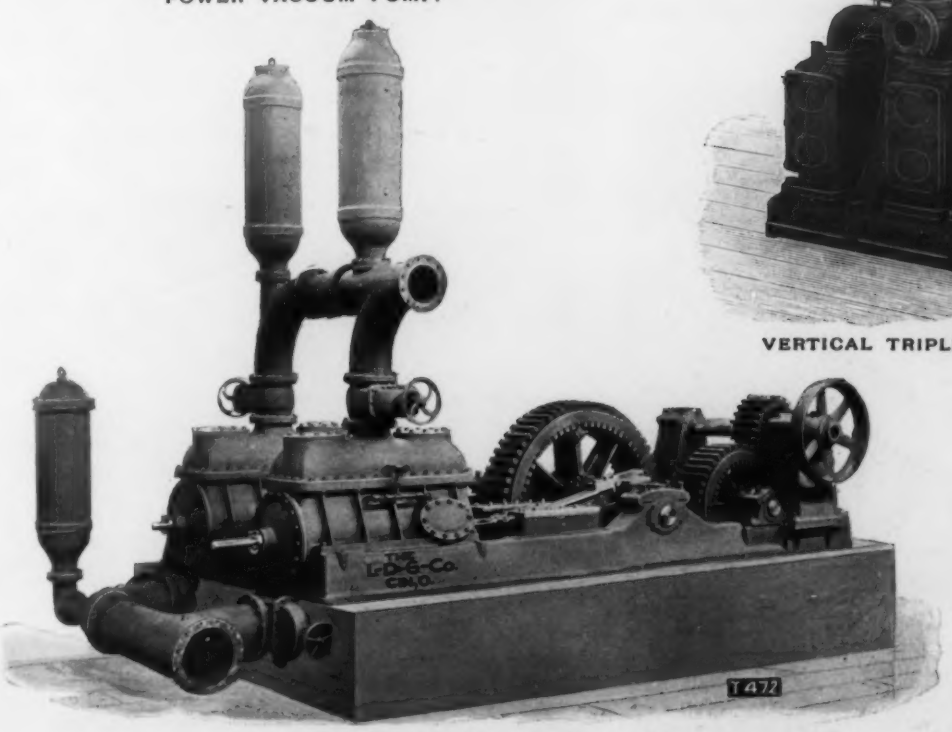


POWER VACUUM PUMP.

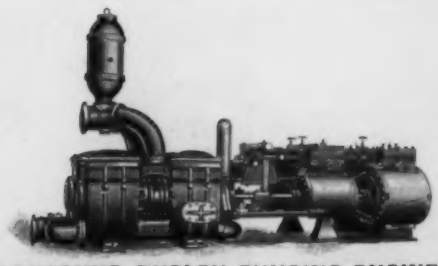
VERTICAL TRIPLEX POWER PUMP.



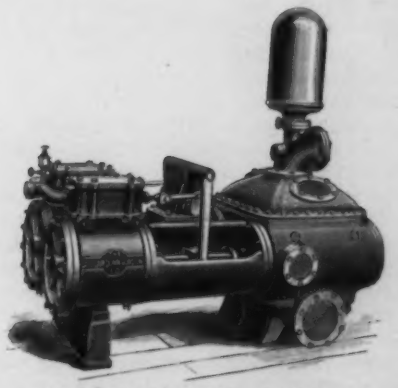
SINGLE AIR PUMP AND CONDENSER.



DUPLEX POWER PUMP.



COMPOUND DUPLEX PUMPING ENGINE.



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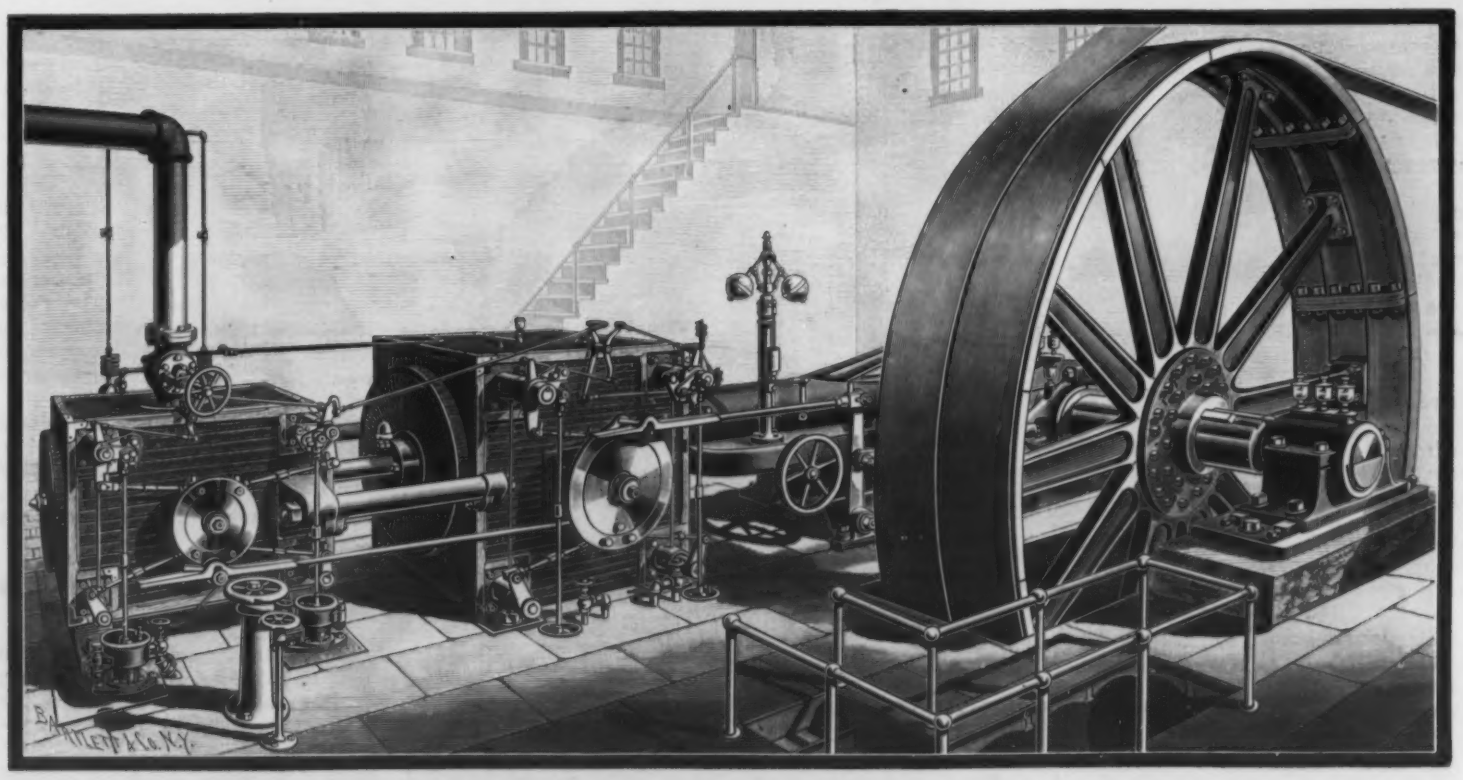

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SLOW-BURNING CONSTRUCTION

THE PRINCIPLE AS APPLIED TO PAPER-MILL BUILDINGS.

The System as Worked Out in Practical Form by Edward Atkinson, of Boston—The First Paper Mill Built Under the System—The Mill Mutual Insurance Companies—Decrease in Premiums.

By FREMONT W. SPICER.

THE object of this article is not to present any new theories, but to group a few facts which led to the adoption of the type of building for paper-manufacturing purposes now well known as "slow-burning constructions," and also to call attention to some matters of detail which experience has demonstrated to be essential in the direction of best results in eliminating the fire risk and bringing the first cost of construction to the lowest limits, and in securing the greatest economy in operation.

Comparatively little progress had been made in this direction until the mill mutual fire-insurance system became an accomplished fact. Their experience soon demonstrated that the loss on paper mills in proportion to the risk taken and the premiums charged was so excessive that unless some steps were taken by paper-mill owners to make such changes as would reduce the hazard they would be refused admittance to the mutual companies.

Edward Atkinson, the great statistician, has been, and is yet, the leading spirit in developing and perfecting the mill mutual fire-insurance system, and though not a paper manufacturer he took the position that the excessive losses were due to faulty theories of design in their construction. A careful and thorough study of the situation resulted in the preparation of plans and drawings expressing his conviction in practical shape, and to which he gave the name of "slow-burning construction." He prepared an address on the subject, which was read before the American Paper Manufacturers' Association, and his views, together with the plans and specifications, were published and distributed among the paper manufacturers of the country. A Paper Mill Mutual Fire Insurance Company was organized, and attention such as had never been given before was directed toward the construction and protection of the paper mills throughout the country. Mills to be eligible to membership in the mutual must reach a certain standard of safeguard, and of them it may be said that the proportion of loss to risk taken and to premium charged places them to-day as well as all other risks; in other words, to those possessing the best safeguards insurance costs only about one-fifth of one per cent. per annum.

The first paper mill constructed after the slow-burning construction one-story plan was the Frontenac Paper Company's mill at Dexter, N. Y., in 1889. The features of the construction were: The mill was without a basement, with foundation walls of stone, brick up to the window sill line, roof supported by square wood posts 8 feet apart, spaces between being filled with windows of unequal length, large ones below and small ones above, and each section separated in two parts by a mullion, lower ones fixed, upper ones on trunnions; planed, grooved and spliced roof of 3-inch plank, then 1½-inch common lime and sand mortar, then 1-inch boards, and finished with a cover of the best prepared roofing, the pitch being half an inch to the foot toward the eaves; a monitor over the machine for ventilating; shafting carried to adjustable hangers attached to the heavy rafters, except in the machine room, where large cast-iron brackets were bolted to the posts which supported the roof, and upon these brackets was carried the shafting.

Among the advantages were noted these: There was practically no condensation on the machine-room roof, no vibration of the building or machinery, no stairs to climb up or down, every bearing in plain sight, great convenience in keeping the shafting in proper alignment, no hidden bearings to overlook, get hot and create fires (which, being out of sight, are frequent causes of serious loss on account of the headway the flames get before discovery); heated with hot-air blast, a maximum of light and a minimum of time during which artificial light is necessary, convenience, economy and safety in operation.

Experience has demonstrated that in the machine room the brick wall is not suited to cold climates. The excessive moisture in the air is more or less absorbed by the brickwork, which results in its injury by frost action. The practice of using, instead of brick, cut or sawed stone with a dimension one way corresponding to the thickness of the wall insures a permanent and first-class result.

In the earlier practice large window frames were set between the posts and run from the brickwork to the roof. Later practice has been to eliminate the frame entirely by having the window sash fitted between the posts, using simply a header between the upper and lower windows, attaching the upper windows to the roof with hinges to swing outwardly, and using cement for a window sill at the bottom. Double windows, with an air space between, while desirable, are not absolutely necessary.

The later roofs pitching toward the centre and drained with a suitable pipe (without monitors, ventilation being had by using rotary fans placed in the side walls) and using roof planks 3½ inches thick, then 1½ inches of mortar, then 1½ inches of lumber, all covered with a first-class prepared roofing, have proved to be particularly satisfactory, especially in cold climate. There is so little radiation from a roof of this character that the snows of winter do not melt on it and therefore become an added protection.

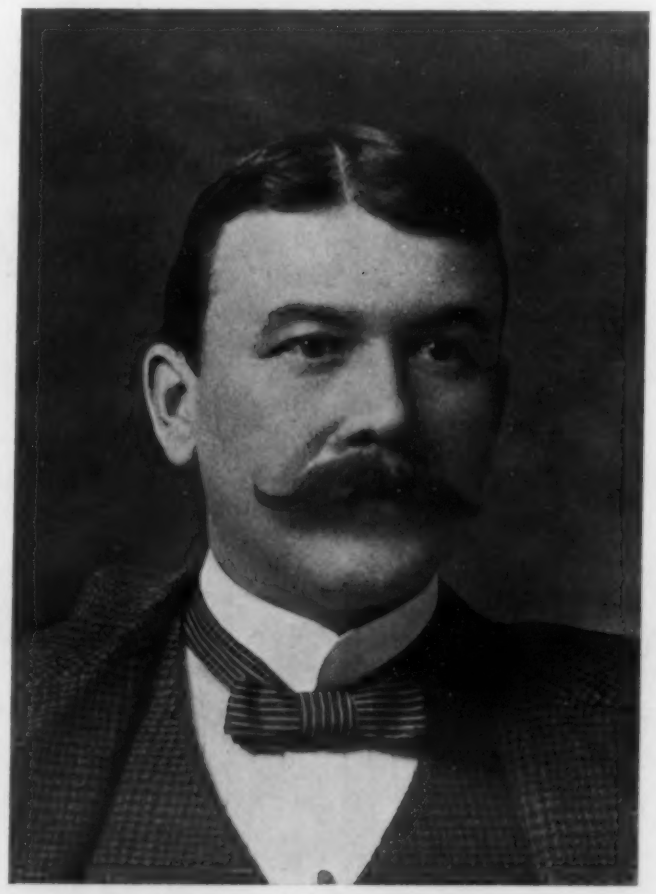
While I do not wish in any way to criticise the great paper-mill architects, yet the fact remains that we are more indebted to Edward Atkinson than to them for the progress made in a safer and cheaper type of construction, which means lower cost of production—a potent factor in enabling us to reach out for a share of the world's trade. I cannot do better than to add here some points from a circular distributed by Mr. Atkinson in response to queries regarding this type of mill.

Slow burning construction consists in disposing the timber and planking in heavy, solid masses, so as to expose the least number of corners or ignitible projections to fire, to the end also that when fire occurs it may be most readily reached by water from sprinklers or hose.

It consists in separating each floor from every other floor by incombustible stops, by automatic hatchways, by encasing stairways either in brick or other incombustible partitions, to the end that a fire shall be retarded in passing from floor to floor to the utmost that is consistent with the use of wood or any material in construction that is not absolutely fireproof.

It consists in guarding the ceilings over all specially hazardous stock or processes with plastering laid on wire cloth or upon dovetailed laths, following the lines of the ceiling and of the timbers, without any interspaces between the plastering and the wood, or else in protecting ceilings over hazardous places with tin or other suitable metal.

It consists not only in so constructing the mill, workshop or warehouse that fire should pass as slowly as possible from one part of the building to another, but also in providing all suitable safeguards against fire.



Fremont W. Spicer.

It consists in laying floors and the outer boarding of the roof over mortar laid upon thick plank, where the maximum of safety is to be attained. Wherever the mill floor, suitably constructed of 3-inch planks grooved and splined and covered with 1-inch top boarding, laid on timbers 8 or 10 feet in centres, has been made continuous—that is to say, without any break for belt holes, open elevators or open stairways—it has never been burned through by a fire upon the floor or by fire passing through the floor above. Iron posts have been crippled or sprung by heat a great many times at an early period of a fire. A wooden post of suitable size has never burned off until other parts of the building were already destroyed—in other words, the mill floor properly constructed and rightly guarded has sufficed to hold fires, not only in the building, but in the room in which they have originated, until the mill fire departments or the public fire departments could extinguish the fire. The wooden mill post of suitable size will last longer than the floor. The mill floor possesses a great advantage over the ordinary joisted floor, in that this may be readily swept away between the timbers either by sprinklers or by water from hose pipes, while in the joisted floor the fire will burn on one side of the joist while the water is playing on the other side.

Mill of Frontenac Paper Company, Dexter, N. Y.

It is dangerous to paint, varnish, fill or encase heavy timbers and thick plank as they are customarily delivered, lest what is called dry rot should be caused by lack of ventilation or opportunity to season. If plastering is to be used it should be plain lime-mortar plastering which is sufficiently porous to permit seasoning.

In addition to the above Mr. Atkinson put some negative propositions which are well worth noticing, viz.:

Slow-burning construction does *not* consist in disposing a given quantity of materials so that the whole interior of a building becomes a series of wooden cells, being filled with concealed spaces, either directly connected with the other or by cracks through which fire may freely pass when it cannot be reached by water.

It does *not* consist in an open-timber construction of floors and roof resembling slow-burning construction, but of light and insufficient size in timbers and thin planks, without fire stops or fire guards from floor to floor.

It does *not* consist in connecting floor with floor by combustible wooden stairways encased in wood.

It does *not* consist in putting in numerous divisions or partitions of light wood.

It does *not* consist in casing or sheathing brick walls with wood, especially when the wood is set off from the wall by furring, even if there are stops behind the furring.

It does *not* consist in permitting the use of varnish upon wood work, over which a fire will pass with the speed of a race horse.

It does *not* consist in leaving windows exposed to adjacent buildings unguarded by fire shutters.

It does *not* consist in permitting the storage of very combustible goods without protecting the ceilings with solid plastering or metal.

It does *not* consist in leaving even the best constructed building in which dangerous occupations are followed without automatic sprinklers, and without a complete and adequate equipment of pumps, pipes and hydrants.

It does *not* consist in using any more wood in finishing the buildings after the floors and roof are laid than is absolutely necessary, there being now many safe methods available at low cost for finishing walls and constructing partitions with slow-burning or incombustible material.

To the insurance man these factors of safety point to the minimum of loss and therefore less rates of premiums, but to the mill owner there are added reasons for his interest. If we are to undertake to supply paper to other countries than our own, we must not only have the best and fastest running paper machines, the most accessible and cheapest raw material, the most skilled workmen, but these must be put into such buildings as will afford the greatest protection from interruption by fire and consequent loss, while the various parts must be in such relation to each other as to afford the extreme of economy in manufacturing. That the development of the slow-burning construction ideas has been an important factor in very many ways in the proper development of the paper industry and this country is unquestioned.

Joining Edges of Waxed Fabrics.

A patent has been granted for a method of joining the edges of previously waxed fabrics, of which the following is a description:

In the manufacture of certain articles, such as bags, etc., in which the fabric is provided with a waxed or oiled coating, as paraffin, it has been found necessary to make the article out of the fabric in its normal or natural state and then apply the coating or wax material, owing to the inability to make a strong joint or seam between the waxed surfaces where the fabric is first coated. This difficulty has arisen from the repellent power of the coating to the adhesive material required to make the joint; but the inventor has discovered that by applying heat and pressure to the seam after the adhesive material has been placed between the two edges the adhesive material is caused to penetrate the otherwise impervious coating and to come into contact with and adhere to the fibres to such an extent as to produce a good, strong joint, which will hold the edges together for any desired purpose.

To carry out the process, glutinous matter, paste, cement or other suitable sticking material of stiff consistency with little moisture in it is applied in a strip or band of desired width, along the margin of one of the sheets of paper or other fabric to be seamed together. There is then lapped upon this the margin of the other sheet to be so united and under some pressure pass over or press upon the joint or seam so formed a heated iron or other suitable implement, by which operation the protecting wax hitherto impervious to the sticking material is so softened or melted that the stiff sticking material penetrates to the fibre or substance of the fabric, fixing and setting itself firmly thereto, while the heat quickly evaporates the moisture of the sticking material, stimulating its chemical action, if any, and leaves the two margins of fabric firmly seamed together and without materially impairing its coating or filling of protecting material.

Heretofore the impervious nature of the coating or filler of such fabrics has been an insurmountable and an impassable barrier or obstacle to securely uniting or seaming them together by the usual methods of gluing, pasting or cementing. The discovery renders it practicable.

This process is applicable both to coated or to saturated paper or other fabric, whether waxed, oiled, or otherwise similarly treated.

On February 13, 1861, a meeting of paper manufacturers was held at Pittsfield, Mass., for the purpose of consulting as to the depressed condition of the trade. Delegates from twenty-one of the thirty-six fine-writing mills of the country attended, representing about $3,000,000 of invested capital. From statements made at the meeting it was estimated that the production of writing paper had doubled in the ten years preceding that time. An association was formed to secure the members from a recurrence of a similar glut in the market, and it was decided that for three months, from the first of March, the production should be reduced one-third.

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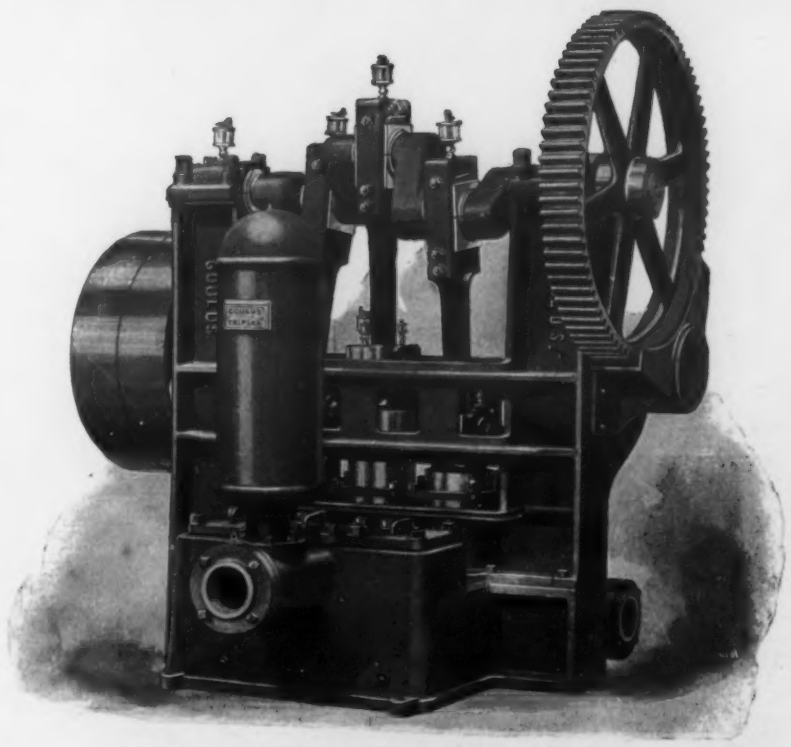

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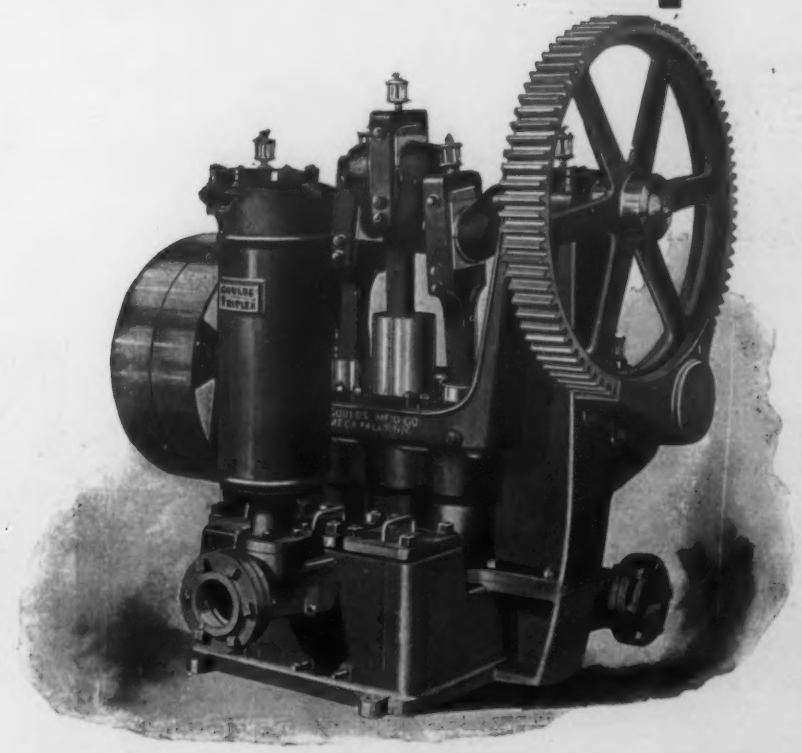

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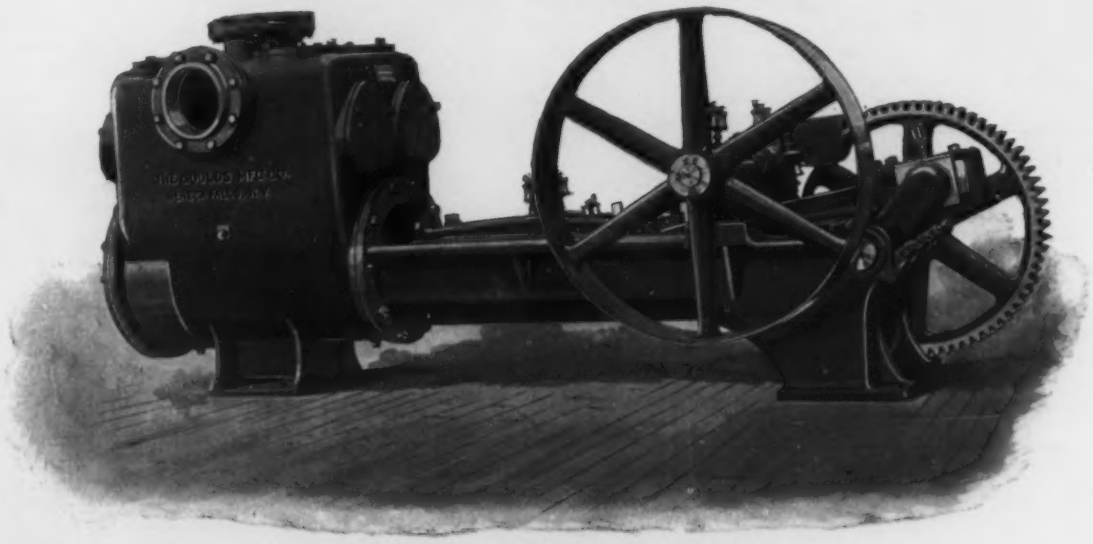

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THE SAMSON TURBINE WATER WHEEL.

THE STRONGEST AND MOST POWERFUL WATER WHEEL NOW BUILT.

The **Samson turbine** is a new design of the James Leffel Wheel, upon which has been given much time and careful thought. Over **thirty-five years'** experience and practice building the James Leffel Wheel affords every opportunity to understand the qualities necessary to meet successfully, under all conditions, the present exacting requirements of a water-wheel plant. The original design of the Leffel Wheel, patented by James Leffel thirty-five years ago, and built by James Leffel & Co. during this entire time, has established its unquestioned superiority in its economical use of water, in its strength and durability, and in its general efficiency.

The **Samson wheel** retains all the valuable features and excellences of the old **reliable** Leffel, which have been so long built. The **double wheel** feature has been retained, as it has by long practice and careful experiment shown its superiority over either wheel separately, in strength of runner and economy of water. The easily operated balanced gates have also been preserved. To these excellent qualities have been added the **double diameter** feature and a number of other important improvements, for which letters patent have been granted. All the best ideas, the most recent discoveries, and the new principles of Hydraulics and Hydro-Dynamics made known in late years, have been most carefully studied and successfully applied in the design and formation of this, the most perfect Turbine.

The **Samson wheel** affords a wonderful amount of power, concentrated within an exceedingly small space, and a far **higher velocity** than has ever been known in Turbines of the same amount of power. The new design affords a remarkably **high economy** of water and steadiness of motion under variable gateage. These points of high merit have been carefully and competently ascertained at great expense by scientific and experimental tests, as well as by practical experience, with a very large number in operation. The Samson wheel is **guaranteed** fully in every respect, and especially in the **tabled power revolutions** and quantity of water used.

As a corroboration of the foregoing, in regard to amount of power, velocity, etc., it may be mentioned that a recent test of a 35-inch Samson, with ⅞ gateage of water and 16.56 feet head, 187 revolutions were obtained and 146.73 horse power, with the useful efficiency of 84.78 per cent. With ¾ water, under 17.33 feet, 178 revolutions, 138.4 horse power and 83.88 percentage of useful effect was obtained.

The **Samson, Special** and **Standard** James Leffel Wheels, which are built on both upright and horizontal shafts in a great variety of styles, afford the customer and user an opportunity to obtain a wheel having the most **perfect adaptation** to every purpose; a wheel **unequaled** in **durability, unexcelled** in **performance,** and **unquestioned** in **excellence.**

New Table of Improved Samson Turbine Wheel.

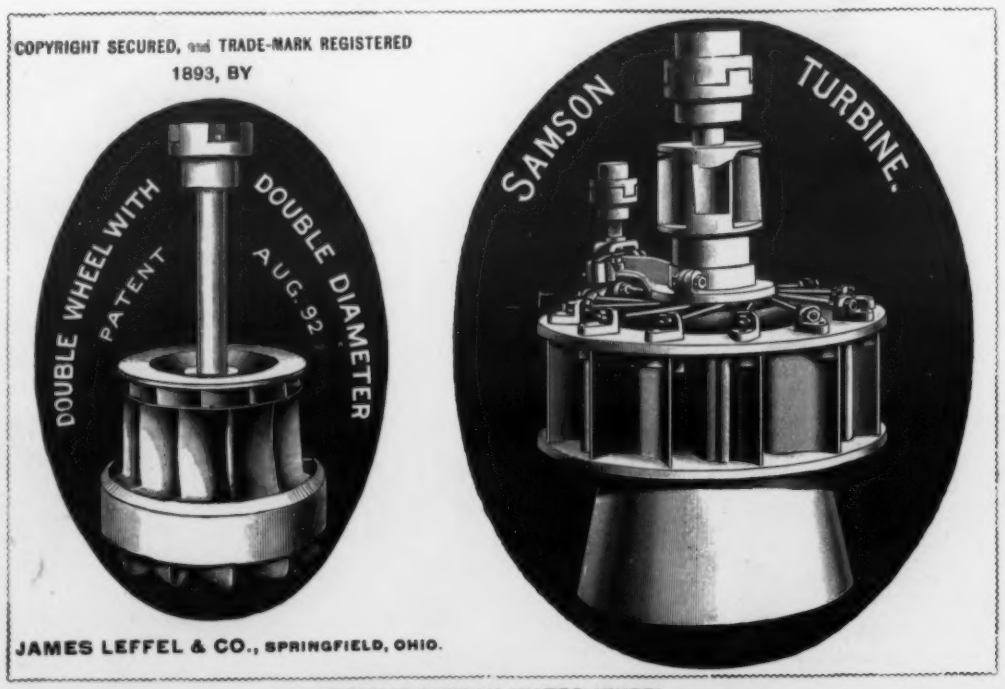
The table of power, etc., herewith given has been estimated and compiled upon thorough experimental tests, on a number of the late Improved Samson Wheels (a couple of the tests being hereafter shown), and upon the practical use of a number of them in operation. We are ready and willing to guarantee the powers and revolutions of these wheels, when placed in the testing flume. These features of great excellence enable us to warrant general results and their successful performance at practical labor, which is always attended by intermittent and variable loads.

The table shows unequaled merit in *power, speed* and *economy of water.* The large power with a given size of wheel has the advantage of less frictional surface, less penstock area, higher efficiency, etc.; while the very high speed for a given power, admits of lighter gearing, shafting, pulleys, couplings, journal boxes, etc., which are less expensive than with a wheel of the same power, but of a less number of revolutions per minute. When adapting machinery to these wheels, it must be remembered that these are the speeds or revolutions per minute when at work.

Improved Samson Wheel Efficiency Tests.

The following table is compiled from recent certified tests, made at the Holyoke testing flume, upon our Improved Samson Turbines. The tests were under the superintendence of Mr. Sickman, engineer in charge, and Mr. Waters, hydraulic engineer. This table will be fully corroborated upon examination of the originals and other recent tests made for us, by the same engineers, reports of which are on file in our office.

These tests show an *unequaled excellence* of the Samson Turbine in a number of particulars, among which may be mentioned; FIRST: *The largest amount of power ever obtained heretofore from a turbine of the same diameter.* SECOND: *The highest speed of turbine ever attained for the same amount of power.* THIRD: *The highest mean efficiency or economy of water ever obtained from reliable tests,*


COPYRIGHT SECURED, and TRADE-MARK REGISTERED
1893, BY
DOUBLE WHEEL WITH PATENT DOUBLE DIAMETER AUG. 92
SAMSON TURBINE.
JAMES LEFFEL & CO., SPRINGFIELD, OHIO.

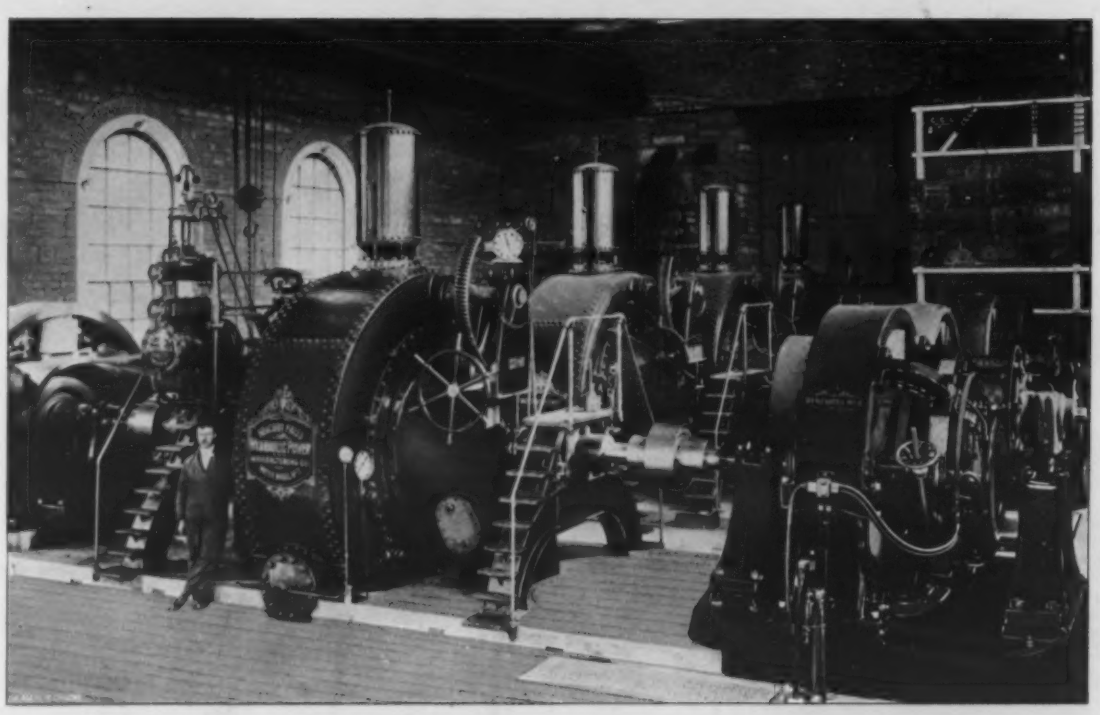
LEFFEL'S SAMSON WATER WHEEL.

22 Table of IMPROVED SAMSON Water Wheels. These POWERS and SPEEDS Guaranteed. Copyright 1897, by The James Leffel & Co.

Size.	Ft. Head.	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
SAMSON 20	Power. Water. Speed.	SAMSON WHEEL		11.9 1293 199	15.0 1396 215	18.3 1493 230	21.8 1593 244	25.5 1699 257	29.3 1750 270	33.6 1825 282	37.8 1903 293	42.3 1975 304	46.9 2044 315	51.7 2111 325	56.6 2179 335	61.7 2239 345	66.9 2300 354	72.2 2360 364	77.7 2419 373	83.3 2470 381	89 2531 390
SAMSON 25	Power. Water. Speed.			11.9 1501 158	15.7 1710 173	19.5 1847 187	24.2 1974 200	28.8 2094 211	33.5 2207 224	39 2315 235	44.4 2418 245	50 2517 255	55.9 2612 265	62 2703 274	68.3 2792 283	74.9 2878 292	81.6 2961 300	88.5 3043 308	95.5 3122 316	103 3199 324	110 3274 332	118 3348 339
SAMSON 30	Power. Water. Speed.	7.10 1545 108	10.9 1754 125	15.2 1935 140	20.1 2195 153	25.3 2390 166	30.9 2523 177	36.8 2570 185	43.2 2621 195	49.8 2959 207	56.7 3040 217	64 3216 226	71.5 3333 234	79.3 3455 242	87.3 3569 250	95.7 3678 258	104 3785 265	113 3888 273	121 3989 280	131 4085 287	141 4184 293	151 4278 300
SAMSON 36	Power. Water. Speed.	0.44 2057 94	14.5 2173 108	20.3 2630 121	26.7 2909 132	33.6 3142 143	41.1 3356 153	49.1 3561 161	57.5 3750 171	66.3 3933 180	75.5 4114 188	85.2 4282 195	95.2 4444 201	106 4600 210	116 4751 217	127 4897 224	139 5039 230	150 5177 236	162 5312 242	175 5443 248	188 5574 254	200 5696 260
SAMSON 40	Power. Water. Speed.	12.8 2789 81	19.7 3220 91	27.5 3560 104	36.2 3944 111	45.6 4260 121	55.7 4554 129	66.5 4830 137	77.9 5091 145	89.8 5339 152	102 5577 158	115 5805 165	129 6024 171	143 6236 177	158 6440 183	173 6638 189	188 6831 194	204 7018 199	220 7200 205	237 7378 211	254 7552 215	272 7721 221
SAMSON 45	Power. Water. Speed.	21.2 4029 81	32.7 5344 92	45.7 5975 81	60.1 6546 85	75.7 7070 96	92.5 7555 102	110 8017 109	129 8456 114	149 8861 120	170 9257 125	192 9635 130	214 9993 135	238 10350 140	262 10689 145	287 11015 149	312 11337 153	338 11645 158	365 11951 162	393 12240 166	422 12534 170	451 12818 173
SAMSON 50	Power. Water. Speed.	29.2 5714 68	40.3 6995 85	56.4 7577 73	74.2 8051 80	93.5 8723 86	114 9131 92	136 9567 98	160 10413 103	184 10812 109	210 11420 113	235 11795 117	263 12344 122	293 12777 126	324 13196 130	356 13603 134	389 13997 138	423 14380 142	457 14754 145	492 15115 149	527 15474 153	562 15824 156
SAMSON 56	Power. Water. Speed.	38.2 7168 56	52.8 8277 65	70.3 9254 73	90.4 10127 80	113 10930 86	138 11700 92	165 12415 97	194 13097 103	225 13776 108	257 14339 113	291 14924 117	326 15495 122	363 16028 126	401 16554 130	441 17043 134	482 17559 138	524 18039 142	566 18508 145	609 18965 149	653 19411 153	699 19847 156
SAMSON 62	Power. Water. Speed.	48.3 8797 45	63.3 10146 52	86.8 11344 59	114 12488 65	144 13419 70	176 14355 75	210 15215 80	245 16042 85	283 16825 87	323 17574 91	364 18293 95	407 18992 99	451 19648 102	497 20292 105	544 20917 108	593 21523 111	643 22113 114	694 22688 117	747 23248 120	801 23795 123	855 24329 126
SAMSON 68	Power. Water. Speed.	58.5 10570 41	78.7 12204 48	104 13645 53	137 14947 59	174 16145 63	214 17255 68	255 18306 72	298 19297 76	341 20238 79	385 21139 83	433 22002 86	479 22837 90	542 23634 93	607 24409 96	654 25160 99	713 25890 101	773 26593 104	835 27290 107	898 27964 109	963 28622 112	1030 29266 115
SAMSON 74	Power. Water. Speed.	67.5 12517 35	88.5 14453 44	124 16159 49	162 17701 54	205 19120 58	250 20439 62	300 21679 66	350 22852 70	401 23967 73	455 25034 76	509 26050 79	570 27039 82	642 27985 85	709 28906 88	775 29798 91	844 30659 94	916 31500 96	989 32318 99	1064 33116 101	1141 33895 103	1221 34656 106

POWERS and SPEEDS Guaranteed. POWER Heads Power WATER Gateage SPEED Required

LEFFEL'S SAMSON WATER WHEEL TABLE.



LEFFEL NIAGARA TURBINE POWER PLANT. (218 ft. Head.)

when running from half to full quantity. The design and construction of the Samson enables us to add the following: FOURTH: *A runner of the greatest possible strength.* FIFTH: *A gate unequaled in the quickness and ease of opening and closing, as they are nearly balanced.*

Test of a 45-inch SAMSON Wheel, Jan. 25, 1897.

Gate Opening.	Head	Rev. Per Min.	Cu. Ft. Per Sec.	Horse Power.	Per Cent.
Full Water	15.00	144.00	172.69	240.97	82.03
⅞ Water	15.04	138.12	155 03	223.61	84.55
¾ Water	15.11	127.67	133.24	191.06	83.68
⅝ Water	15.88	131.50	112 65	162.80	80.25
½ Water	16.47	126.87	90.04	127.73	75.95

Average efficiency ½ to full gate, 81.20 per cent.

Test of a 35-inch SAMSON Wheel, Feb. 1, 1897.

Gate Opening.	Head.	Rev. Per Min.	Cu. Ft. Per Sec.	Horse Power.	Per Cent.
Full Water	15.29	194.25	102.02	143.44	81.08
⅞ Water	16.56	187.75	92.15	146.73	84 78
¾ Water	17.33	178.50	83.95	138.40	83.88
⅝ Water	17.54	176.40	68.82	109.64	80.09
½ Water	17.08	168.50	57 09	88.14	76.19

Average efficiency ½ to full gate, 81.20 per cent.

Six Powerful Leffel Turbines for Niagara.

The illustration of a completed Turbine Plant, taken direct from a photo in the power house, shows four of six of the Leffel Niagara type of Turbines purchased by the Niagara Falls Hydraulic Power and Manufacturing Co. Two of these wheels have been in use constantly night and day for three years past at Niagara Falls. The performance of these is mentioned in the following letter from Mr. Hastings, the Manager. These two are of 2,400 horse-power capacity, and the remaining four, which are shown in a group herewith, are giving near 9,000 horse power, driving eight generators, connected direct to the wheels. Besides these six powerful Turbines, two others of same make, of 300 and 400 horse power respectively, are also in daily operation at Niagara Falls.

The four wheels shown have their casings built of steel plates ¾ of an inch thick, with cast-iron heads 3⅛ inches thickness, substantially secured by strong stay bolts. The shafting is of the best hammered scrap, and the bucket portion of the runners, or circumference, is made of the best bronze, the centre hub and arms being built of unusual strength. Three of the runners are 74 inches and three 66 inches diameter, all making about 230 revolutions per minute, a speed which corresponds with the generators and the pulp grinders, which the six wheels are driving by direct connection. The gates are steel and operated by a patent balance thrust device. The weight of each complete wheel is 50 tons.

The water is admitted to these six wheels underneath, between the steel beam foundations. Large pipe conductors of 10 feet in diameter are placed under the floor of the power houses, and huge valve gates are used near the wheel before the water enters, these gates being operated by hydraulic cylinders. The size of the cases is sufficient for the complete circulation of the water about the guide casing, water being admitted direct to the runner through a series of guides placed between the plates of the inner casing, which serve the purpose also of gates for shutting off the water. Two of these wheels are used for driving eight powerful pulp grinders, and four of them are used for driving eight dynamos of 1,000 horse power each. The wheels of 9,000 horse-power capacity are under a maximum head of 218 feet, about 60 feet more head pressure than any Turbines now in use at Niagara Falls, this being the highest head under which Turbines of equal capacity have ever been placed.

Running 24 hours, 6 days a week.—Mr. Hastings, Manager, writes as follows: "Cliff Paper Co., Niagara Falls, Oct. 28, 1896. James Leffel & Co. Gentlemen:—We desire to write you, expressing our satisfaction with the wheels we are running of your make. The two Horizontal Double Discharge Wheels of 1,200 horse power each, under 125 feet head, which we are using for grinding wood pulp, have been running now for three years with no repairs, running twenty-four hours six days in the week, and we have no criticism to make, which is the best recommendation we could give them. We are also running one 300 horse power same style and under the same head, to drive electrical generators, which we use to drive our paper machines by electricity. This wheel has been running about six months, and we have never even had to look into it; running night and day and at times we have helped our neighbors out, and are now running an electric railroad, which is a hard test. Anyone buying wheels, we would advise buying from you, from our experience."

Description of Leffel's Turbines Continued.

Seven Pairs of Samson Wheels, Giving 13,000 Horse Power.

The two cuts of the 40-inch and 45-inch Samsons shown herewith were made direct from photos taken of this machinery when completed and erected on the shop floor. These two styles of plants, combining twenty-seven wheels in all, were purchased by the Glen Mfg. Co. of New Hampshire, for their extensive wood-pulp and paper mills. All of these wheels connect direct to the wood grinders in the simplest possible form, the speeds being so arranged that the wheels and the grinders are the same. Thirteen of the 40-inch Samson Wheels were purchased, and seven pairs of the 45-inch Samsons. These last mentioned seven pairs have a capacity of 13,000 horse power, and the entire plant of twenty-seven wheels of the two styles of mounting is of a much greater capacity. The 13,000 horse power mentioned does not include the power of the 40-inch Samson Wheels, since they are located under a somewhat less head.

The runners of the 45-inch Samsons are made of bronze, with plate steel buckets. The entire arrangement is of great strength, of the best material and workmanship, and the best and most compact design. The water enters on the top and discharges at the bottom, a small portion of the draft tube being shown underneath the steel beam work. A portion of these wheels go into a new mill, and a part of them take the place of another make of turbine, said to be a popular wheel. These Samson Wheels were chosen on account of their high efficiency in the use of water, the great strength of the runner, and the unprecedented speed at which the power is obtained. The whole plant of wheels is an example of the highest perfection in design and construction of modern Turbine work.

On examination of the table of this Improved Samson Wheel given herewith, it will be seen that this style and character of wheel possesses several features of great excellence already mentioned. In the foregoing mentioned work, the selection of the Samson Wheels was made largely on account of the great strength of the runner, which is a combination of two wheels in one, affording a design unequaled in strength and durability. The wheels were designed to operate under very trying conditions, where they will be frequently subjected to requirements of wonderful strength. The great capacity of the wheels and their unprecedented speed, which is shown in the tables, adding to the merit of their strength, induced their purchase and application. The speed and ease with which the gates are also operated, under the excessive head pressure to which they are subjected, are also among the requirements of the highest excellence in modern Turbines.

1,800 Horse-Power Turbine.

The illustration at the top of the page herewith was also made direct from a photo taken of the wheel when completed on the shop floor. It is of special design, for a head pressure of 80 feet and the speed admitting of direct connection to the wood-pulp grinders. The wheel was sent to Vermont for a new water power and an entirely new mill and outfit.

The pulleys at the end of the shaft, shown in the illustration, are for transmitting a small portion of the power for auxiliary work about the plant. Outside of the pulleys half couplings are shown, which connect to the couplings of the grinder shafts, located on each side of the wheel and connected to each end of the wheel shaft direct. On the opposite side of the case is arranged a portion of the case which can be removed so that an attachment of another pipe or wheel can be made, if it is thought advisable to further improve the power. This design of wheel secures great strength, and is adapted to the peculiar or special requirements made necessary for the surrounding conditions of the plant.

15 Leffel Wheels, Giving 6,000 Horse Power.

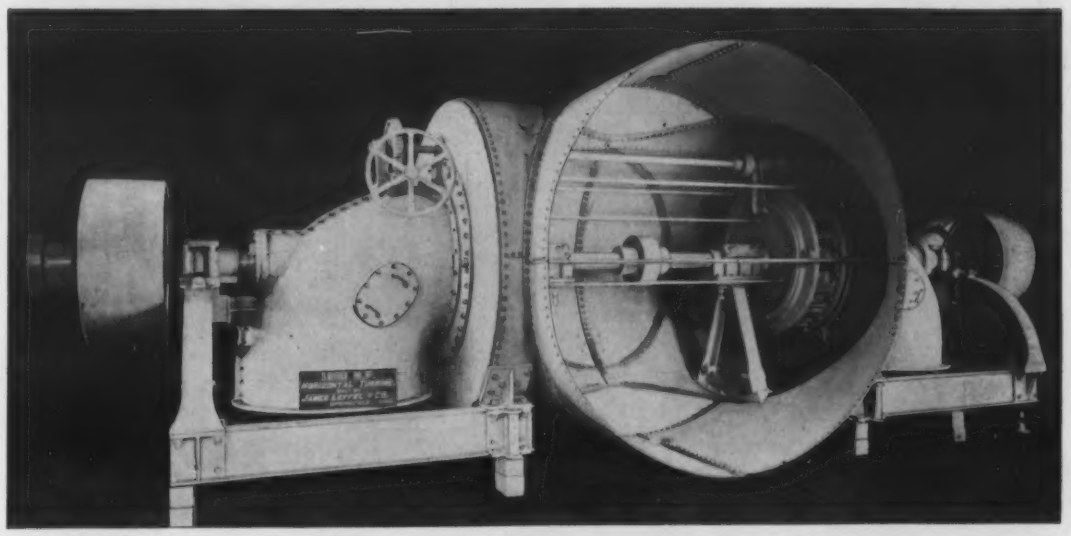
Many instances might be mentioned in which this wheel is used in large pulp and paper mills, and the following letter may be of interest to that class of manufacturers, as the plant alluded to is an extensive one, and also specially built, the wheels being placed in large cases, to which pipes are connected from the bulkhead, carrying the water horizontally and then perpendicularly on top of the wheel, very similar to the plant shown herewith of the 45-inch Samsons.

Several years ago Mr. Warren Curtis, superintendent of the Hudson River Pulp and Paper Co., of Palmer's Falls, wrote us as follows:

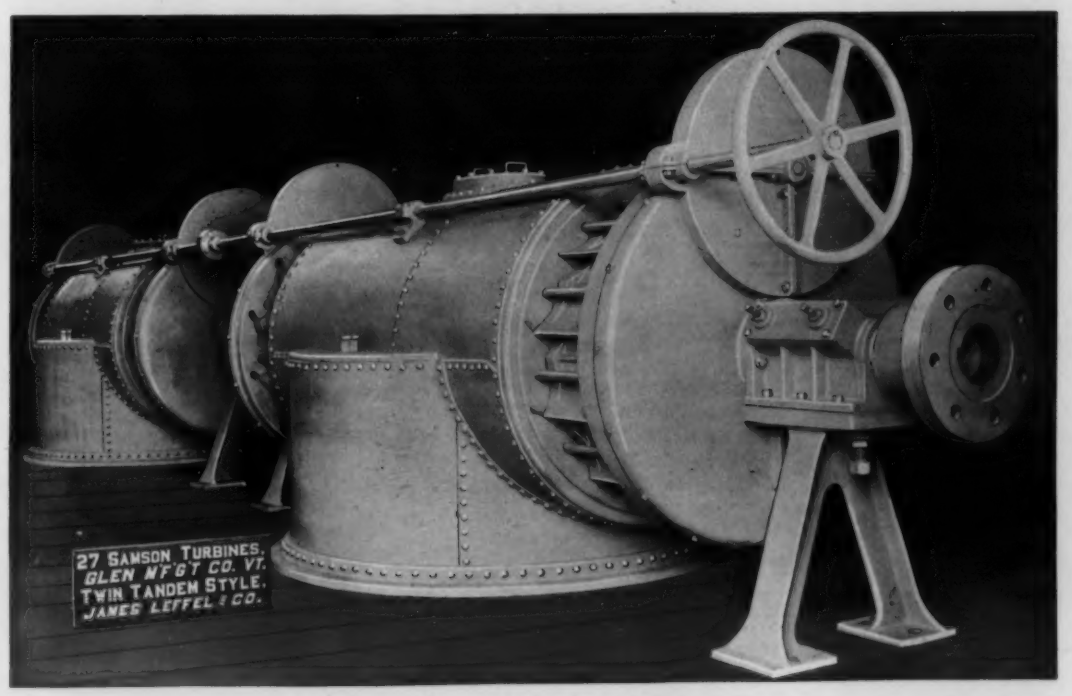
GENTS—In reply to yours of the 6th inst., asking "how our new wheels worked under the conditions we placed them," would say that we have no fault whatever to find with them; in fact, they are doing more work with less water than we calculated on, that is, the two sets or runs we put in and started last October (1884). They have been running almost constantly day and night since. We have only had occasion to look at them once since, and that was for the purpose of clearing out some blocks of wood that got in the canal below rack. As we knew of no similar work, or any of such magnitude as a precedent to go by, we naturally gave the planning of our motive power and connections a great deal of thought and study, and after looking over the various turbine wheels of different builders we decided on yours as having the greatest number of good points in its favor, and the satisfactory working of the two runs as mentioned confirms us in our conclusions.

After running the two sets (***1,100 to 1,200 horse power each***) day and night for six months we were so well satisfied with the results that we have erected two more sets, exact duplicates of the first two in every particular. We had a practical illustration that we studied very closely while in actual operation, and could not find a single point in any of the details that we thought we could change or alter to advantage. We expect to get the new wheels and machinery running next month, when we will have about 5,000 horse power in that mill alone. These wheels, cases, etc., are all contained and the power consumed in a room 70 by 80 feet, without the use of gearing or belts. Our wheels in the pulp mill are placed twenty feet above the tail water; rather the bottom of the draft tube is twenty feet below the centre of the wheels, and the water in the wheel pit stands one to two feet above the bottom of the tubes, making a column of water eighteen to nineteen feet in height hanging below the centre of the wheel shaft. We have a vacuum gauge attached to the top of draft tube which indicates sixteen to eighteen inches of mercury, showing that we lose nothing to speak of by placing the wheels on horizontal shaft and above the discharge water. Calling the specific gravity of the mercury 13.6, our gauge shows that the water in draft tube stands above the centre of shaft.

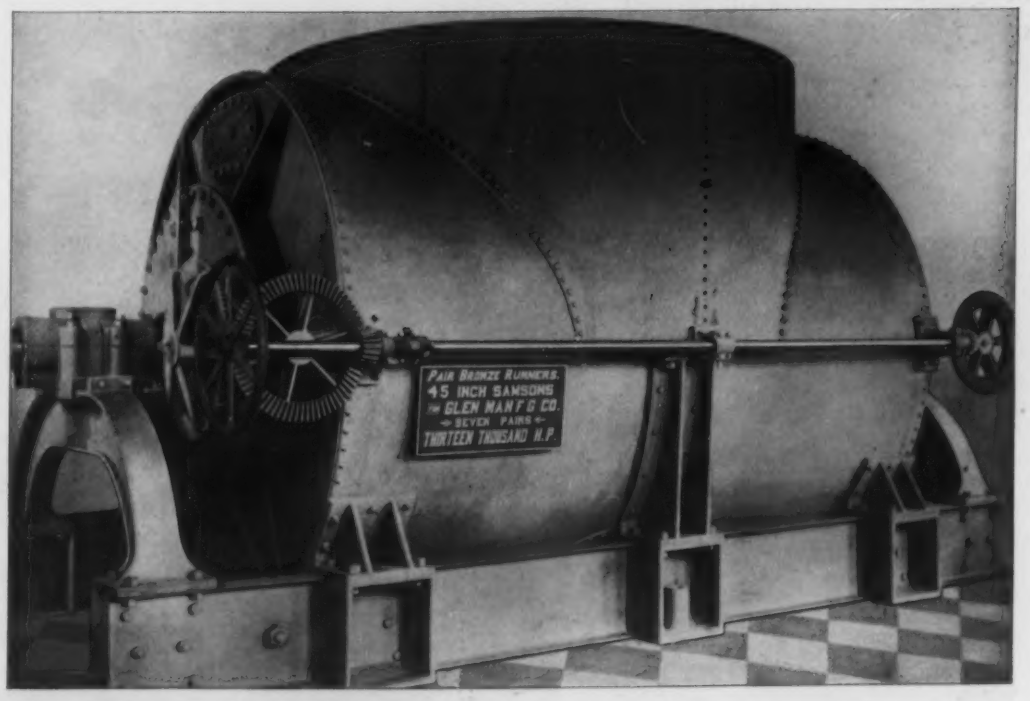
In the fall of 1883 we placed two of your special size and built 44-inch wheels on our lower level, on a horizontal shaft under 28-feet head, and they have been working day and night ever since. They replaced a 60-inch wheel on an upright shaft. The old wheel was not able to drive half our present machinery up to speed on full work. These new wheels drive everything up briskly and not using full gate. We measured the water from old wheel and that used by your two 44-inch, and found the latter using considerably less water and giving us ample power. Formerly steps and gears bothered us; now we have neither step nor gears. We have now ***fifteen of your wheels*** (all except one 23-inch) working on horizontal shafts, giving nearly 6,000 horse power.



LEFFEL 1,800 HORSE POWER TURBINE WHEEL.
Direct Connection to Wood Grinders



TANDEM 40-INCH LEFFEL SAMSONS.
Direct Connection to Grinders.



PAIR 45-INCH SAMSONS. 2,000 HORSE POWER. FOR WOOD GRINDING.

Extensive Electric Lighting, Power and Railway Plant.

In presenting the beautiful illustration on the opposite page, of the Niagara Electric Plant of Leffel wheels, it might be further added that the same wheel is used extensively in various parts of the country. A recent plant of six 68-inch Samson Wheels was installed, of a simpler type, however, than the Niagara, this plant being upright shaft wheels, conveying the power by means of a couple of horizontal lines, geared into the upright shafts of the wheel. Upon the connecting lines convenient apparatus has been arranged for throwing on or off the gearing of any particular wheel, or throwing off or on, by means of friction pulleys and belts, either one or any one of the powerful generators.

This plant is located at Columbus, Ga., and is of excellent design and execution of work. Of this plant Mr. J. Wainwright, Vice-President of the Drake & Stratton Co., wrote Dec. 1st, 1896, as follows: "Gentlemen—I wish to speak of the excellence of the water wheel work and the satisfaction it has given us in its performance, which you supplied us last year for our electric railway, electric power and lighting plant. It consists of four 68-inch Samson wheels with vertical hammered shafting, carrying the large heavy mortise master wheels for driving the pinions located on the hammered horizontal shaft, which in turn carries the large belt pulleys, which answer for balance wheels, the friction pulleys and the friction clutch couplings. All of these are carried upon steel beams with over and under heavy arched heavy substantial cast-iron bridge-trees, carrying the journals. The arrangement is such that either of these wheels can be driven, or a combination of them.

Besides the water wheels and pit gearing afore mentioned, the underpinning or steel beams of the penstock, supported by the heavy cast-iron posts, surmounted by a series of steel beams above, which carries the entire gearing and shafting plant, has also answered its purpose perfectly. The complete set of designs which you supplied for all of this work enabled your constructing engineer to erect it without a single change or mistake throughout being made, and with no difficulty and no expense further than the mere erection.

The triple governing combination for driving the combined electric railway, power and lighting plant has given excellent satisfaction, and the whole affair has been so substantially designed and built, and has proven so successful, that we were induced to order of you a duplicate of this plant to enable us to further extend our improvements; and we trust you will give us as good a combination of machinery throughout as you did in the original or first portion of the work. We feel fortunate in being connected with a house so competent to fulfill all its agreements as to quality, finish and erection of the machinery.

JAMES LEFFEL & COMPANY,

Springfield, Ohio, U. S. A.

AMERICAN ENDLESS FELTS.

THE FIRST DOMESTIC PAPER-MACHINE FELTS PRODUCED IN MAINE.

Inexperience of the Early Manufacturers—A Great Deal of Wool Wasted in an Effort to Produce the Result Sought—The Second Successful Mill Located in Ohio.

By D. M. FULLER.

IN reply to a request by the editor of THE JOURNAL for some information in regard to the early manufacture of felts in America, I would say that the earliest knowledge I have in regard to this is that in 1863 Samuel T. Thomas, of Laconia, N. H., inventor of the Thomas open-shed loom, conceived the idea of the manufacture in America of felts for paper-makers' use, and early in 1864 made arrangements to form a partnership with Johnson, Fuller & Co., of Warren, Me., to manufacture felts and other woolen goods.

Johnson, Fuller & Co. were engaged in the manufacture of cassimeres and other woolens in Warren, where they had carried on the business for a number of years. They were favorably impressed with the arguments of Mr. Thomas, and decided to undertake the manufacture of felts. A new partnership was formed for this purpose, the firm style being also Johnson, Fuller & Co., and the partners being Mr. Thomas, Albert Johnson, Andrew Fuller and Charles C. Newcomb.

A mill located in Camden, Me., was leased. This mill was about 40x100 feet, two stories high, with basement and sub-

D. M. FULLER.

basement. A granite dye house and picker house were also included in the plant. Two sets of machinery were purchased, and Mr. Fuller removed to Camden, Me., to take charge of the mill there, Mr. Johnson remaining in Warren to look after the interests of the old firm at that place.

A few years later the mill at Warren was disposed of, and Mr. Johnson moved to Camden. The machinery was rapidly placed in position, and in the fall of 1864 the first endless felts made in the United States were made by this firm.

At first great difficulties were encountered, and several thousand dollars' worth of wool was made into felts that were of no use to paper makers. It was supposed at first that all felts were woven endless, until Mr. Fuller discovered upon close examination of a foreign felt that it was joined or spliced together by hand. This solved many difficult problems, and as each difficulty was met it was overcome by the invention of new machinery and by Yankee ingenuity.

Arrangements were made with Bulkley, Dunton & Co., of New York, to take the agency of the felts, and a few years later Rice, Kendall & Co., of Boston, were also appointed agents for New England in connection with Bulkley, Dunton & Co. These firms have remained agents of this mill, and have seen its growth from its small beginning in 1864 to its present dimensions. The mill has been enlarged several times, new buildings being erected, and its reputation for first-class work is unequaled.

Mr. Thomas sold his interest in the firm to Mr. Alden, and after Mr. Alden's death, in 1872, the firm of Johnson, Fuller & Co. was changed into a stock company called the Knox Woolen Company. Mr. Johnson was president and treasurer, and Mr. Fuller superintendent.

The mill continued under this management until 1879, when Mr. Fuller resigned, and B. C. Adams was elected president and Mr. Johnson superintendent.

The next firm to successfully manufacture felts in the United States was Schuler & Benninghofen, of Hamilton, Ohio. Asa Schuler commenced the manufacture of woolens in 1853 in connection with A. Breitenbach. In 1859 John W. Benninghofen went in with Mr. Schuler, and they bought out Mr. Breitenbach. The mill was called the Miami Woolen Mills. In 1865 this mill was burned to the ground, and as the insurance was light the loss was heavy. The plant was at once rebuilt, and by January 1, 1866, the new machinery was placed in position. This mill had made some piece felting for paper mills as early as 1854, but did not make any endless felts until the latter part of 1866.

Mr. Schuler came in contact with an Englishman who had worked in an English mill, and who resided near Hamilton. This man showed Mr. Schuler how the felts were woven together by hand. From that time this mill has constantly added to its plant as occasion required, and has recently erected a new factory which is finely adapted to their business.

About 1872 H. Waterbury, of Rensselaerville, N. Y., commenced to manufacture felts, and soon after F. C. Huyck was taken in as a partner. In 1878 they dissolved partnership. Mr. Waterbury went to Oriskany, N. Y., where the business established by him there has grown to large proportions, and is at present conducted by the H. Waterbury Sons Company, the bulk of the stock being owned by the five sons of H. Waterbury.

Mr. Huyck moved to Bethlehem, N. Y., near Albany, and formed a partnership with Mr. Boynton. After running about one year Mr. Huyck took C. E. Argersinger into the firm, buying out the interest of Mr. Boynton. Andrew Fuller, of the Knox Woolen Company, and his son, D. M. Fuller, were engaged as superintendents. The business grew rapidly, and machinery was constantly added, until in May, 1894, the mill was burned out. Soon after this the firm was dissolved. Mr. Huyck then took his sons into partnership, built a mill at Greenbush, now the city of Rensselaer, N. Y., and is at present making a large quantity of woolen goods, sleeping bags, felts, etc.

In 1886 Mr. Boynton and sons started in the manufacture of felts at East Aurora, N. Y. W. G. Waggoner was taken in as a partner in 1888, and in 1892 the business was sold to a stock company. In 1895 the mill was burned out.

The Acme Felt Company started in Albany in 1886, and sold out in 1892. Some of the other felt manufacturers bought their machinery.

The Akron Woolen and Felt Company, of Akron, Ohio, started in 1889, and sold out to the F. Grey Company, of Piqua, Ohio, in 1892.

The Lockport Felt Company, of Newfane, N. Y., started in 1887.

The Megunticook Woolen Company, of Camden, Me., started in 1892.

The Appleton Woolen Company, of Appleton, Wis., also started to manufacture felts in 1892.

Green Brothers, of Cazenovia, N. Y., started about 1889.

The Albany Felt Company, of Albany, N. Y., started in 1895.

The Rumford Falls Woolen Company started in 1894.

L. Heathcote, Glen Rock, Pa., started about 1884 or 1885.

There have been several other mills that have started in the manufacture of felts and have since given up the business. Among others there are Weiss & Son, of Charleston, Ill., in 1887; mills in Lawrence, Mass.; Louisburgh, Pa., and a mill in Philadelphia.

Felts have been made to some extent in Canada by two or three parties, but not in any amount, most of the felts used in Canada being imported either from Europe or the United States.

An Appeal for Rags.

S. & A. Hawley & Co. in 1808 erected a mill near Fort Edward, N. Y., and in order to secure raw material they issued the following appeal:

Save Your Rags!

This exclamation is particularly addressed to the ladies, both young, old and middle aged, throughout the northern part of this State by the subscribers, who have erected a paper mill in the town of Moreau, near Fort Edward—nor is it thought that this appeal to our fair countrywomen will prove unavailing when they reflect that without their assistance they cannot be supplied with the useful article of paper. If the necessary stock is denied paper mills, young maids must languish in vain for tender epistles from their respectiye swains; bachelors may be

CAMDEN MILL, WHERE FIRST FELT WAS MADE.

reduced to the necessity of a personal attendance upon the fair, when a written communication would be an excellent substitute. For clean cotton and linen rags of every color and description, matrons can be furnished with bibles, spectacles and snuff; mothers with grammars, spelling books and primers for their children, and young misses may be supplied with bonnets, ribbons and ear rings for the decoration of their persons (by means of which they may obtain husbands), or by sending them to the mill they may receive cash.

STRAW WRAPPING PAPER.

THE HISTORY OF THE INDUSTRY IN NEW YORK STATE.

The Empire State Started the Industry—The First Mills—Equipment of the Early Plants—The Stocks Used—Those Who Have Been Factors in the Industry.

By JOHN D. TOMPKINS.

STRAW-PAPER making was one of the earliest of the important industries of Columbia and Rensselaer counties, New York. Though late in the present century before the manufacture of straw wrapping paper was taken up in earnest, the rapid strides of progress during a period of less than three generations have been interesting, even really marvelous, and quite in keeping with the development of most great industries belonging to this wonderful Yankee nation. Among the States our own Empire was "the pathfinder" in the manufacture of this paper.

It is well remembered by many yet living that the first papers of any kind manufactured in America were formed by a tedious process with the hand mould, a single sheet at a time, 12x16 or 24x36, at the rate of one sheet in from two to three minutes.

The mould being immersed in a vat of diluted pulp and dexterously lifted out, was then shaken in order to cross the fibres and rid the forming paper of as much water as possible before placing it upon a piece of woolen cloth to sustain the tender sheet as it was turned over and separated from the mould. To

ANDREW FULLER.

do this skillfully and rapidly was a coveted achievement, and he who accomplished it successfully was pronounced a good paper maker.

A granduncle of the writer, Plato B. Moore, now in his ninety-third year, and still retaining possession of his faculties equal to most men a score of years his junior, tells of one Eleazer Cady, who was, during 1826 or 1827, a pioneer in the manufacture of paper by hand in a little mill having one small Hollander beating engine, about a mile above Chatham Four Corners, Columbia County, on the Steinkill. Eleazer Cady sold his paper to the stores around the country as he could obtain orders, making it from flax, cotton, linen and woolen rags, sometimes mixing with them a small portion of rye or wheat straw.

The cylinder machine was yet unknown in Chatham, nor did the people at that time dream what an important part the paper industry was to take in their business interests throughout the town within the next fifty or sixty years.

Much of the land in Columbia County was of rich alluvial soil, particularly adapted to the culture of flax and grain. Rye straw was procurable in vast quantities during those early times, and at a small price, as there was really no market for it.

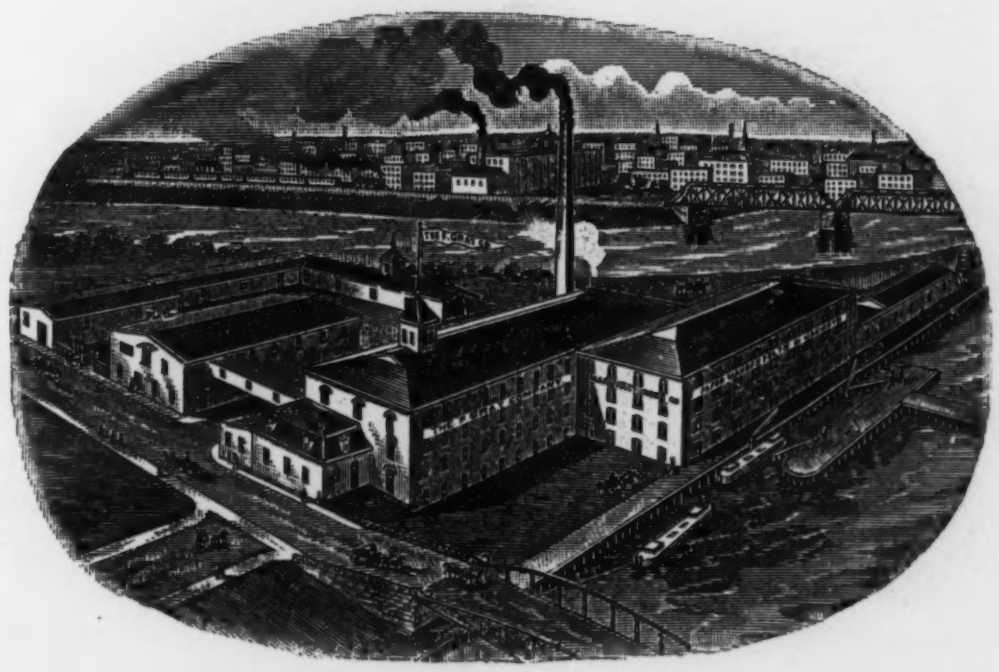
Hamilton & Wright were paper makers who came to Chatham Four Corners from Connecticut. In that State a mill had been built with a paper machine in it that could make a sheet of paper a yard wide and practically endless; it was wound on drums, then cut into sheets of desired widths. This was considered so great an improvement on the preceding method that no outside persons were permitted to enter the mill or learn the modus operandi, which was kept secret as long as possible. Hamilton & Wright, being mechanics as well as paper makers, were so intent upon learning about this wonderful improvement in paper making that they sought by some means to possess themselves of the coveted knowledge.

At a time when the mill referred to was not running they effected an entrance through the wheel pit, and, going in where the machine stood, after careful examination made a draft of

PIQUA PIQUA

PIQUA WOOLEN MILLS

The F. GRAY COMPANY, Piqua, Ohio, U. S. A.



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FOURDRINIER and CYLINDER

FELTS.

PRESS FELTS AND JACKETS FOR

ALL KINDS OF PAPER

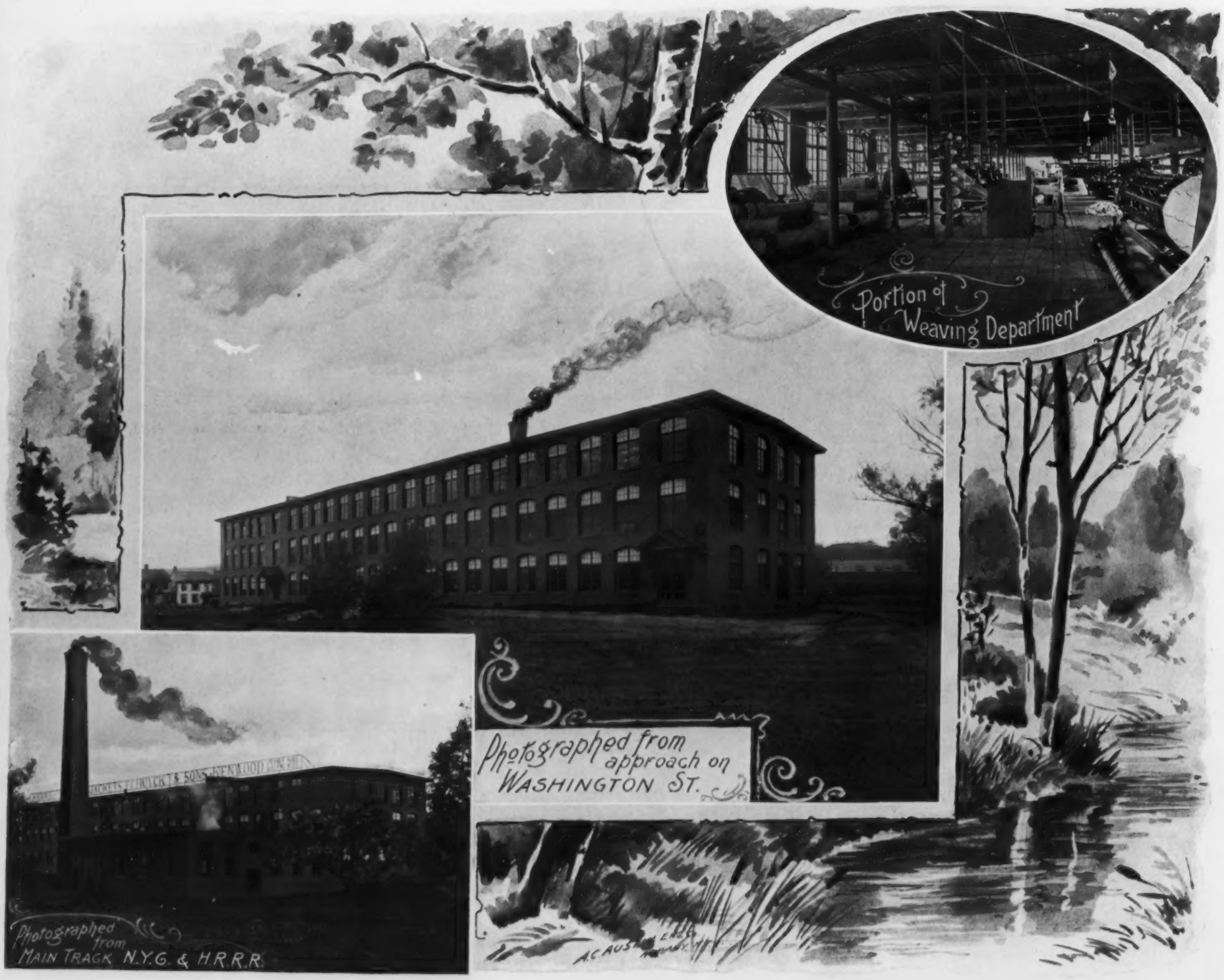
PIQUA PIQUA

Kenwood Felts and Jackets

ARE STANDARD FOR THE WORLD

of the best and most practical development in the manufacture of Woolen Clothing for Paper and Pulp Machines.

They have helped to make possible the immense production of paper of the modern machine.



Kenwood Felts and Jackets, by a combination in their manufacture of the best American and English methods and machinery, have been given the best qualities of both American and English Felts,

We make woolen Felts, wet and dry, Jackets and other mechanical cloths for all kinds of paper and pulp machines, for every variety of paper and pulp, to be used under all possible conditions.

F. C. HUYCK & SONS, Kenwood Mills,

ALBANY, N. Y., U. S. A.

À TOUS LES FABRICANTS DE PAPIER DU MONDE.

Les Feutres et Manchons de Kenwood sont employés par les plus grands fabricants de papier et dans les maisons les meilleures installées des Etats-Unis, et aussi sur les machines les plus larges, ainsi que sur celles qui marchent au plus grande vitesse. Ils sont arrivés à satisfaire la demande constante des fabricants américains de papier pour les Feutres et Manchons que pourraient supporter un plus grande vitesse, que dureraient plus longtemps et que donneraient un meilleur apprêt à toutes les qualités de papier. Ils ont rendu possible la production immense de papier de la machine moderne. Dans les pays hors des Etats-Unis nous faisons concurrence des fabricants de Feutres et nous avons reçu beaucoup de succès. Nous croyons que les fabricants de papier trouveraient bien des avantages en employant les Feutres et Manchons de Kenwood, et nous desirons avoir une occasion pour vous bien expliquer leurs mérites en détail plus qu'il ne nous est possible dans une annonce. Nous voulons vous faire savoir ce que nous avons fait pour les autres fabricants de papier et ce que nous pourrons faire pour vous.

Nous vous prions de nous écrire et nous sommes persuadés que nous pourrions vous intéresser. Quant à notre responsabilité et la réputation des Feutres et Manchons de Kenwood nous donnons comme référence quelque propriétaire ou directeur d'un moulin à papier américain qu'il soit, ou bien un constructeur des machines à papier, ou les propriétaires des journaux intéressés dans la fabrication de papier.

F. C. HUYCK & SONS, Kenwood Mills, Albany, N. Y., U. S. A.

AN DIE HERREN PAPIERFABRIKANTEN IN ALLEN WELTTHEILEN.

Die Kenwood Filze und Ueberzüge werden in den grössten und auf das Beste eingerichteten Papierfabriken der Vereinigten Staaten benutzt, auf den breitesten Maschinen, sowie auf Maschinen, welche mit grösserer Geschwindigkeit arbeiten als irgend welche andere der Welt. Diese Filze haben den beständigen Forderungen amerikanischer Papierfabrikanten nach Filzen und Ueberzügen, welche schneller laufen, länger halten und allen Sorten Papier ein besseres Aussehen verleihen, als andere entsprochen, und haben dazu beigetragen das ungeheure Erzeugniss moderner Papiermaschinen möglich zu machen. Auch im Auslande machen unsere Filze denen anderer Fabrikanten verschiedener Länder erfolgreiche Konkurrenz. Wir sind überzeugt davon, dass die Herren Papierfabrikanten in allen Ländern die Benutzung von Kenwood-Filzen und -Ueberzügen vortheilhaft finden werden, und wir hoffen Gelegenheit zu haben Ihnen mehr Betreffs derselben mittheilen zu können, als uns möglich ist in einer Anzeige zusammenzufassen. Wir möchten Ihnen zu Wissen thun, was unsere Filze für andere Papierfabrikanten geleistet haben, und was dieselben auch für Sie zu leisten im Stande sind. Wir ersuchen die Herren Fabrikanten an uns zu schreiben, und sind überzeugt davon, dass unsere Antwort Sie interessiren wird. Was den Ruf unserer Firma und den der *Kenwood Filze und Ueberzüge* anbetrifft, so verweisen wir sie an den Eigenthümer oder Direktor irgend einer beliebigen amerikanischen Papierfabrik oder Papermaschinen-Fabrik, oder an die Herausgeber der verschiedenen amerikanischen Fachzeitungen.

F. C. HUYCK & SONS, Kenwood Mills, Albany, N. Y., U. S. A.

TIL PAPIR OG TRÆMASSEFABRIKANTER I NORGE OG SVERIGE.

Kenwood filter og jackets (strömper for valser) benyttes i de störste og bedste udstyrede papir og træmassefabrikker i de Forenede Stater, paa de bredeste og mest hurtiggaaende maskiner i verden. Vi har stadig imödekommet de Amerikanske fabrikanters fordringer for filter og jackets, at de skal löbe med större hastighed og vare længere med en större production end nogen anden filt, og paa samme tid opnaa en bedere finish paa alle sorter papir. Kenwoods filter for træmasse og cellulosefabrikker er saaledes vævade at traadene ikke brister selv ikke under det störste tryk. De löber ret, presser godt, er stærke og solide og varer saa længe at deres kostende er meget liden naar hensyn tages til det quantum stof de kan producere, de er lettere i vegt end andre filter, hvilket er en besparelse i prisen paa samme tid som de er af længere varighed og besidder större produktionsevne.

Udenfor de Forenede Stater har vi med held optaget concurensen med andre fabrikanter af filte saavel for papir som for træmassefabrikker. Vi tvivler ikke om at de vil finde mange fordele ved at benytte Kenwood filter og jackets, og vil med glæde give alle oplysninger de önsker, specielt for Kenwood filter for mekanisk og kemisk træmasse. Vi önske at de skal vide hvad vi har udrettet for andre fabrikker og hvad vi kan gjöre for dem hvis de vil forsöge vor vare, derfor skriv til os og vort svar vil sikkert interessere dem.

Med hensyn til vort renome for filter og jackets henviser vi dem til enhver ejer eller bestyrer af hvilkensomhelst amerikansk papir eller træmassefabrik saavel som til de forskjellige fabrikanter af papirmaskiner og redaktörer of fagskrifterne.

F. C. HUYCK & SONS, Kenwood Mills, Albany, N. Y., U. S. A.

it. They then, in 1830, purchased the site where Eleazer Cady made paper by hand, near Chatham Four Corners, and, building a machine from their drawings made at the Connecticut mill, started Columbia County's first cylinder machine on straw wrapping paper.

About a year later, Hamilton & Wright dissolving partnership, Hamilton remained in possession of the new mill, while Wright negotiated for a sawmill plant farther down the stream, about two miles below "the Corners." There in 1882 he built the second straw-paper mill having a cylinder machine.

Asa Schuler.

This property years afterward came into the possession of Capt. Cornelius Shufelt, who leased it to Rathbone & Simmons; yet later it was owned by States D. Tompkins. About the time of or a little after the building of the last-mentioned mill another straw-paper mill was erected by Ebenezer Backus and Thomas Wheeler. The site chosen was just above the Hamilton mill, on a small power formerly utilized by a woolen factory, and this mill was later designated "The Mud Mill."

Water for beater and vat was taken from a small brook near, which had sufficient head to carry the water to the mill by the force of gravity. The source of the brook being some distance away up in the hills, it flowed down through cultivated fields, and became so roiled by every thunder shower or heavy rain as to render it unfit for the purposes required, causing the mill to shut down until the stream was again flowing clear. This proved such an annoyance to the management and help that the mill became known far and near as "The Mud Mill."

This mill, and some years later the Wright mill also, employed a fire dryer, these being the first straw mills in which paper was dried other than in "dry lofts."

The Steinkill was a fair-sized, reliable stream, affording from 40 to 50 horse power, with 14 feet overshot or corresponding breast wheel, during seven to nine months of the year, which was thought very good for those days, when paper was little used, and more especially in that farming region, where harvest helpers were in demand for two or three months each summer. This stream was rock bound in many places, and the fall rapid, furnishing almost ideal sites for building dams with falls varying from 10 to 30 feet, and developing power sufficient for the requirements of those times.

William Davis, another granduncle of the writer, with Plato B. Moore purchased the old Dorr fulling mill, situate on this same stream, about midway between Chatham Four Corners and East Chatham. They remodeled the premises in 1837, and then started the fourth paper mill in Columbia County.

In 1838 Philip Winnegar and Plato B. Moore, the latter an expert millwright and mechanic, built a mill near Queechy Lake. The ironwork was done at Gifford's, in Hudson, N. Y., costing, it is said, $1,000.

These were the pioneer straw-paper mills of Columbia County, and although at this time the paper was called straw paper, about 20 per cent. of "hard stock"—rope and bagging—was incorporated with the straw to make the sheet "run good."

These mills served to supply all the trade with straw paper for a time. Later, however, the demand increased in New York city, where some of it had been sent and where it seemed to meet with approval.

The Hudson and Berkshire Railroad, about this time one of the first in America, greatly increased transportation facilities from that section. Freight was carried to Hudson dock, and then taken down the Hudson River to New York.

The next straw mill was built in Rensselaer County, town of Nassau, N. Y, near Brainard's Bridge, on the Kinderhook Creek. The site for this mill was purchased by the writer's maternal grandfather, John B. Davis, and title therefor obtained on October 30, 1845, which was also the day of the writer's birth. Here during the following year the writer's father, Peter C. Tompkins, joined John B. Davis, both being Columbia County men, in building the first straw wrapping-paper mill in Rensselaer County. The mill was afterward named the XX straw wrapping-paper mill, commanding by far the largest water power yet employed in this industry. The stream was of a size requiring a dam at this place 180 feet long, having a head and fall of some 16 feet, which has since been improved and its former capacity nearly doubled.

Here was built the largest mill yet started on straw—a two-story building and basement, planned for four 30-inch Hollander engines and a 36-inch cylinder machine. Although the mill was started with two engines and the paper dried in lofts, it was not many years before other beaters were added and a 48-inch machine with steam dryers was substituted.

Straw was procured from the farmers, but the "hard stock" had to be drawn from Stuyvesant Landing, on the Hudson River, a distance of 15 or 16 miles. Until the completion of the Harlem Railroad, paper made at this mill was drawn to that place also for shipment to New York. The "hard stock" used was cut quite short with a small broad axe on a large chopping block, and placed in the engine directly after it had been furnished with cooked straw.

This mill was equipped with two large, square bleach vats, while prior to this date the mills of Columbia County had only one. The bleaches were about 12 feet square and 10 feet deep, the floor of the bleach room about the vats, the top of which was even with the floor, inclining toward the bleach vat, so that liquor should flow toward the vat when straw was hooked or thrown from the bleach. One of the most laborious positions in a straw-paper mill was ever that of bleach man, from the earliest date of the industry down to the time of the introduction of the Tompkins digester system, which I will touch upon later. In no department of paper making have greater improvements been made in labor-saving and economic devices, facilitating the extreme use of large quantities of straw, than in the bleaching, as then termed, or cooking department.

The boilers of the mill last mentioned were about 3½ feet in diameter, one in each bleach. They were set into the square vats, resting a little above the bottom on brick or iron supports. A large round hole was cut out on the front side for the end of the boiler to project; on the outer end of the boiler hung a large door nearly or quite the size of the boiler shell. In this outer end of the shell grates were arranged for a furnace to be fired with cord wood; from the rear end of the boiler shell, running the whole width of the bleach, were, on either side, return flues of perhaps a foot in diameter; these two flues also passing out through the front side of the bleach, were then connected with a chimney located somewhere near the front of the boiler. The bleach vats, being made of plank, had to be caulked around the boiler shell, and return flues, a stream of water being allowed

Old Rensselaerville Woolen Mill.

to trickle through a perforated lead pipe arranged around and above the boiler and ends of flues for the purpose of preventing the outside of the bleach from catching fire. In a mill like this, "built for business," the firing had to be done at night, largely in or about the straw department of the plant.

The bleaches were filled and operated from the floor directly over the fire room. This system was hazardous, but, strange as it may seem, as few disastrous fires occurred from this source as from all others combined. In filling the bleaches lime water was either applied by hand with a pail or allowed to run in from the lime box, the latter being done mostly when "liquoring off."

Firing and boiling were continued until the straw was cooked—"done." The bleach to be "throwed" was "stripped," the timbers and planking being removed early in the morning before breakfast. Very little straw could be taken from the vat with a fork, the top of the straw usually lying two or more feet below the floor, and being covered with boiling hot liquor; hence two-pronged hooks on poles varying in length from 6 to 12 feet were used to hook into the straw and throw it out upon a high pile on the floor. A strip or toe piece was nailed all around the edge of the vat to keep the bleach man from slipping in, notches being sawed out at intervals to permit the liquor to run back into the bleach.

The saturated cooked straw was very heavy, and it was hard work to throw a bleach, which was necessarily done over a hot vat in a hot, steam-filled room, and, summer or winter, a man could wear nothing except overalls and shoes. Laborers having nerve and courage, with great powers of endurance, were essentially requisite to perform the allotted work on time.

From the bleach room the engineers with shorter-handled hooks dragged the straw, as wanted, to the side of beaters located on the same—the second—floor with the bleaches.

The wash water for beaters, as in most other mills of this period, was pumped by applied power to the shaft of a walking beam, with valve plungers on either end and working in a tube 10 or 12 inches square, operated in or over a large, square tank, from which water was taken for the engines or bleach, as required. The pump was arranged and driven by gears that could be thrown in or out by slowing down the speed.

In the year 1848 Peter C. Tompkins sold out and was succeeded by his partner's sons, D. P., C. F. and Oscar Davis. Removing with his family again to Columbia County, he took possession of and completed a mill then building by his brother, States D. Tompkins, on the site next below the Davis & Moore mill, started eleven years previous on the Steinkill Creek, half-way between Chatham Four Corners and East Chatham, directly on the line of the Hudson and Berkshire Railroad, where a switch and siding were employed for delivery of "hard stock" and cord wood, as well as for loading paper from the mill door.

Among the first iron shafts used in paper-mill water wheels was one put in the engine wheel at this place from the wreck of the steamboat Swallow. The wrecking of the Swallow on a rock at Athens will be remembered by some. From this wreck a portion of the steamer's shaft was obtained and put in the engine water-wheel here, in substitution for a fine white-oak stick already secured for the purpose. In those days, when such ironwork was rarely seen, this arrangement was considered a fine stroke of business.

This mill, like all others built especially for straw paper, was a loft-drying mill. The stuff chest was located behind the machine, on a level with the top of the cylinder vat and equipped with a large-sized faucet gauge, similar to a molasses faucet, for the regulation of the stuff as it ran to the machine.

In straw mills, a stuff pump was unknown at this time. The cylinder itself was made tapering, one end being about one-eighth or three-sixteenths of an inch larger than the other, and had to be covered by an expert, who, taking careful measurements, cut the wire cloth accordingly and sewed it together, first tacking it on a felt roll, the latter being suspended from the ceiling. After the seam was finished, the new face was put on by standing the cylinder on its largest end and the wire face was carefully slipped down over it about seven-eighths of the way, until it began to come to a fit. To get it the rest of the way was the "rub." I remember, when a boy hardly old enough to be around a mill, seeing my father with bottle and old rubber shoe in hand persuading a new face to a fit, and the look of triumph that lighted up his countenance as the job was finished.

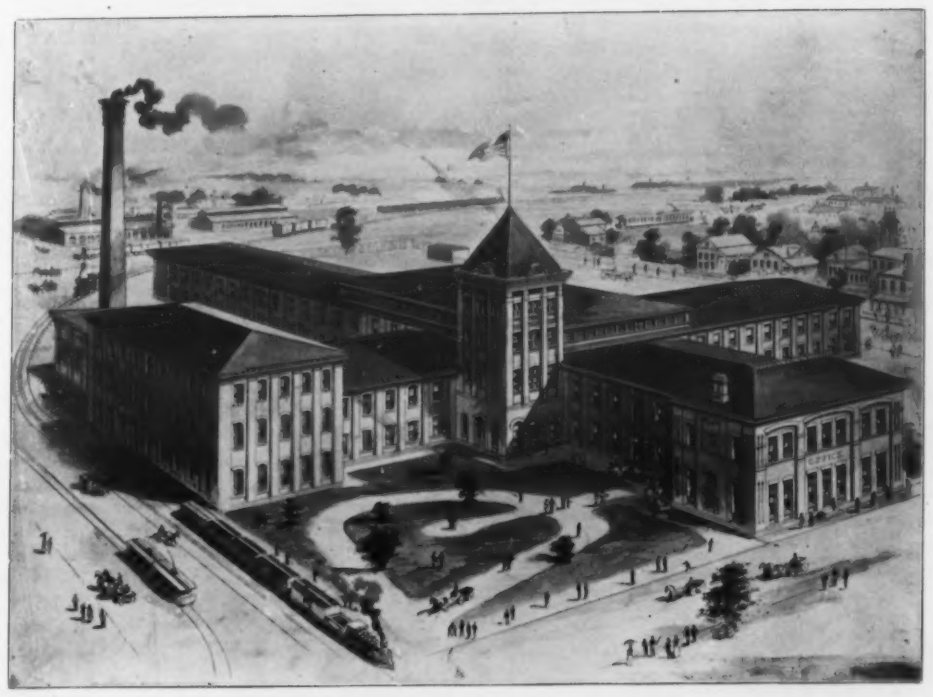
The couch roll was covered in those days with old felting. The paper, wet as it left the press, was run on lay boys, each machine having two, so that when one was filling the other was rolled back on a low cutting bench, where the paper was cut through lengthwise of the lay boy and rolled off flat on the bench and cut up.

The sheet made on the machines up to this time was 30 inches wide and the diameter of lay boys sufficient to make three sheets 20 inches wide; thus each lay boy would furnish three cuts and the sheets would be 20x30 inches square. The cutting was done with the half of an old hand saw, the teeth ground off and point rounded on the cutting side. This knife was kept sufficiently sharp to cut through 3 or 4 inches of wet paper without tearing the edges. The paper was then piled in high piles about the machine room or taken immediately to the lofts, as circumstances permitted.

The gauge or limit of a paper mill's capacity from this time on seemed to be the amount of dry-loft room at its disposal. This mill had extensive lofts three and four floors high, and the wet paper from the machine room in the basement of the building had to be carried, three cuts at a time, up long flights of stairs through long bays and deposited on a table, made of an old flour barrel covered with boards, to be afterward hung on poles with a "cross stick" in tufts of from five to eight sheets. This was usually the work of the bleach men in the afternoon, their bleach having been thrown and filled in the morning. The paper was left hanging until dry, the time required depending altogether upon the weather, but when dry was taken down from the poles by more dextrous workmen and placed in large piles to await carrying down by the bleach men to the machine room, when they returned for more wet paper. Skill was required in the management of lofts; shutters had to be adjusted

John W. Benninghofen.

THE "HAMILTON" FELT



OUR mills are thoroughly equipped for the manufacture of paper makers' felts of every description, such as Common, Fine and Superfine, Fourdrinier and Cylinder, Wet and Press Felts, Jackets, Strainer Cloth (tubular and piece), Couch Roll Covers, etc., suitable for making every kind of paper, pulp and board. Besides enjoying a well-earned popularity in the United States, the "HAMILTON" felt has for many years been used in paper mills and strawboard mills in Canada, Mexico, Japan, and Australia.

CORRESPONDENCE IS INVITED.

In writing, inclose sample of paper or board made, and mention kind of stock used, quality of paper or board made, speed and width of machine, as well as sizes of felts used, and we will quote prices and send samples.

SHULER & BENNINGHOFEN

Hamilton, Ohio, U. S. A.

SMITH PAPER CO.

LEE, MASS.

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Has twenty-five years of success to back it.

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The only Safety Paper with imitators.
Not only the best, but the cheapest—costing but little more than unsafe safeties.

Safety Paper

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Valley Iron Works Mfg. Co.,

MAKERS OF

PAPER MILL MACHINERY, WATER WHEELS, ETC.

Appleton, - - - - - - Wisconsin.

with constant care and judgment, as high winds or sudden storms might destroy large quantities of paper. After drying the paper some parts of it were liable to be "huffy," and when carried back to the machine room it was "laid over" as soon as possible, then piled in high piles again to season, while awaiting its turn at the finisher's hands.

Peter C. Tompkins ran this mill for a time by the ream, and then purchased it from his brother, States D. It was in this mill, through the skill and experience of Peter C. Tompkins, that straw wrapping paper was first made from straw exclusively and for some time before it was known to other manufacturers, and not then until he disclosed the secret, which he did later by comparing a sheet he was making without "hard stock" with a sheet made in another mill incorporating "hard stock," and submitting them to States D., asking: "Which of these two is the better sheet?" States D., after critical comparison, replied: "This one," handing it back. Peter C. then said: "That sheet was made without hard stock." States D., doubting the truth of the assertion, was taken through the mill and shown that not a pound of hard stock was in the mill; neither had there been for a long time.

Peter C. Tompkins was a natural genius and experimenter. He early learned the secret of properly preparing rye straw in order to obtain from it the best fibre and put it in the best condition to make a good sheet of paper. He applied himself to this particular feature of the trade, and even at this early period learned that the best paper was made from fibre best prepared before reaching the machine. In after years, when putting in a second press and steam dryers, upright reels and cutter, this little mill outrivaled all the little mills of its day for quantity and quality of product. It was thought to be the first machine to run from 75 to 100 feet per minute on straw wrapping paper. Shortly after the adoption of the return tubular boiler and steam dryers during the '50s bleaches began to be built round instead of square, and false bottoms were introduced, by which with levers, windlasses and chains the cooked straw was raised out of the liquor. Bleach men could then stand on the cooked straw and pitch it out with a pitchfork, which was considered a great improvement in the handling of this heavy material. The ironwork for this arrangement was built in Hudson at the Gifford shop.

About the time the Davis mill, near Brainard, Rensselaer County, N. Y., was built, Samuel Hanna, of New York, and Horace W. Peaselee, from Valatie, N. Y., were operating a mill at Malden Bridge, Columbia County, that had been started for a "fine mill," with four beaters and washers and a 48-inch cylinder machine. The washers and beaters were on the first floor and the machine on the floor of the room above; but, not working satisfactorily changes were made, and the mill was turned to making straw paper. A few years later the firm became Peaselee & Benton. Afterward Horace W. Peaselee bought out his partner, and thereafter ran the mill alone.

H. W. Peaselee, who had formerly operated the Valatie, N, Y., foundry and machine shop, was an able business man and a mechanical genius. To him is accredited the invention and use of the first sponge-covered coucher; also of the "Peaselee straw washer." The latter came into general use early in the '60s. He was the first man also to make straw paper and straw boards on a "double-mould" or a two-cylinder machine.

It was not long after the "modern improvements" came into use in the manufacture of straw paper, viz., tubular boilers, steam dryers and bleaches with false bottoms, during the '50s, before the building of straw-paper mills increased.

States D. Tompkins was interested in building three in close succession; at Chatham Centre, Columbia County, N. Y., he was associated with others in building what became known as the Bullis mill—a double mill, the first of its kind, with four beaters and two 48-inch machines; also one at Sandlake, Rensselaer County, N. Y., a mill with two beaters and one 48-inch machine, and a third at his home place, about two miles below Chatham Four Corners, on the Steinkill, having two beaters and a 48-inch machine. Isaac H. Son and Philip Winnegar operated a mill in Central New York. In 1854 Plato B. Moore built and ran a steam-dryer mill at Marcellus Falls, N. Y.

A mill at Stuyvesant Falls, N. Y., was run by Edward Coventry about this time, while other mills sprang up about the country. Many ownerships changed, as the demand for straw paper from 1857 to 1860 seemed hardly equal to the amount produced. Profits were small, and straw-paper makers had a hard time; but from 1862 to 1873 paper could not be produced fast enough to supply demand, and prices rose fabulously high, at one time reaching $1.10 per ream for 15x20, 10 pound. During this period the number of mills increased, and many mills were enlarged.

The Smarts were at Troy, J. W. Rossman & Son and H. S. Van De Carr at Stockport, Carpenter and Peaselee at Ancram, Charles E. Bingham at Blue Stone, Gifford and Schermerhorn, Sherman Brothers and others were in the western part of the State, and a little later large mills were erected at Penn Yan and along the Hudson, until both sides of the river could boast of its prosperous straw mills, fifty or more in number.

The demand for rye straw in eastern New York became enormous, and prices ranged from $15 to $30 per ton. After 1875 the West began to loom up as a great straw-paper producing section. From that time dated our struggle for existence; economize as Eastern manufacturers would the West could undersell them, having the advantage of securing raw material at lower rates for supplying their newer mills, embodying all the improvements known to the trade in the East.

These factors not to be overcome, small mills in the latter section began dropping out, and to-day over two-thirds of the straw-paper mills of the Empire State have either been turned on other papers or dismantled.

That such severe competition should push manufacturers in the East to do their utmost toward instituting economic systems followed essentially. Just this condition of existing circumstances led to the conception of the Tompkins digester suspension system, as applied to the art of paper making. "Necessity" was still, as of old, "the mother of invention." The idea, relating first to the use of straw, applied with equal force to the reduction of other raw material under pressure. We have seen the ideal system of "the good old times," as employed in the manufacture of straw paper in the mills of '47, briefly described in this article. Let us now, in conclusion, look at the model system in a straw-paper and board mill of '97, and see what improvements have developed within the last fifty years.

First, we begin with the self-evident fact that to produce a maximum amount of product with a minimum amount of power is a strong factor in making either straw paper or straw board.

Second, to produce a tough, pliable product at a minimum expense is an eminently desirable feature in the manufacture of wrapping papers or box boards, and third, it is also a self-evident fact that to produce a maximum amount of product at a minimum amount of expense in labor, skilled or unskilled, is another important factor in making either paper or boards.

In the ideal straw mills of 1897 the system is to cut the straw into one-half or three-quarter inch, short half-stuff lengths at the rate of a ton in fifteen minutes, or at the rate straw in bundles is usually unloaded from a wagon. The cut straw is at the same time elevated and dropped into an upright digester, where hot liquor showers it down as fast as it is being filled. When completed sufficient liquor is added and the cover of the digester is securely closed.

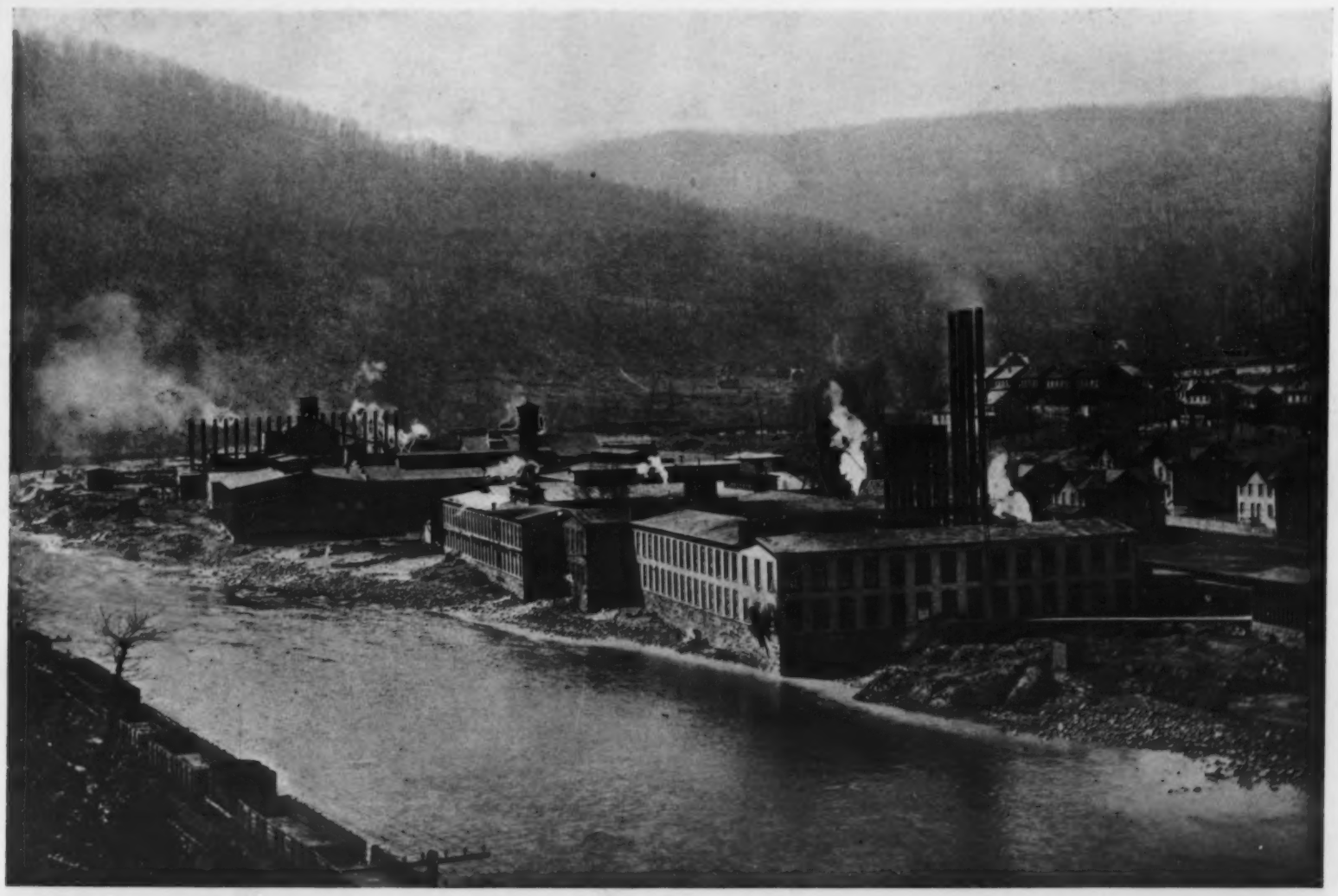
The cooking mass inside is kept in a suspended condition by ascending rays of steam heat or currents of heated liquor, under such varying pressures and lengths of time as suit the requirements of circumstances. A stock tester is employed for ascertaining the progress of the cook at will.

When thoroughly done the contents of the digester are blown out under pressure, which process so separates and shreds the material into silky fibres that by simple washing it is prepared for the machine in the manufacture of heavier papers without the use of beaters, or it may be refined by Jordans for finer and lighter grades.

No manual labor is required for handling the stock from the time it is cut until taken from the machine—a continuous process.

In 1801 David Buel, postmaster of Troy, N. Y., published the following:

"*Please save your rags.* The press contributes more to the diffusion of knowledge and information than any other medium; rags are the primary requisite in the manufacture of paper, and without paper the newspapers of our country, those cheap, useful and agreeable companions of the citizen and farmer, which in a political and moral view are of the highest national importance, must decline and be extinguished. The paper mills of the State, could the poor and the opulent, the farmer and the mechanic, be persuaded into a laudable frugality of saving rags, would turn out ample supplies of American paper to answer all demands. The people of Massachusetts and Connecticut, with true American zeal, have introduced this exemplary saving into the economy of their houses. The latter, by fair calculation, make yearly a saving of rags to the actual amount of $50,000. The ladies in several of the large towns display an elegant work bag as part of the furniture of their parlors, in which every rag that is used in the paper mill is carefully preserved. Were this example imitated, this State would not be drained of its circulating cash for paper and other manufactures which American artists can furnish. The poor, by the mere saving of rags, may be enabled to procure paper and books for schools and family use and more agreeable articles of dress or consumption. The rich who regard the interests of their country will direct their children or domestics to place a bag or box in some convenient place as a deposit for rags, that none be lost by being swept into the street or fire, the sales of which savings will reward the attention of the faithful servant and encourage the prosperous habit of prudence and enterprise."



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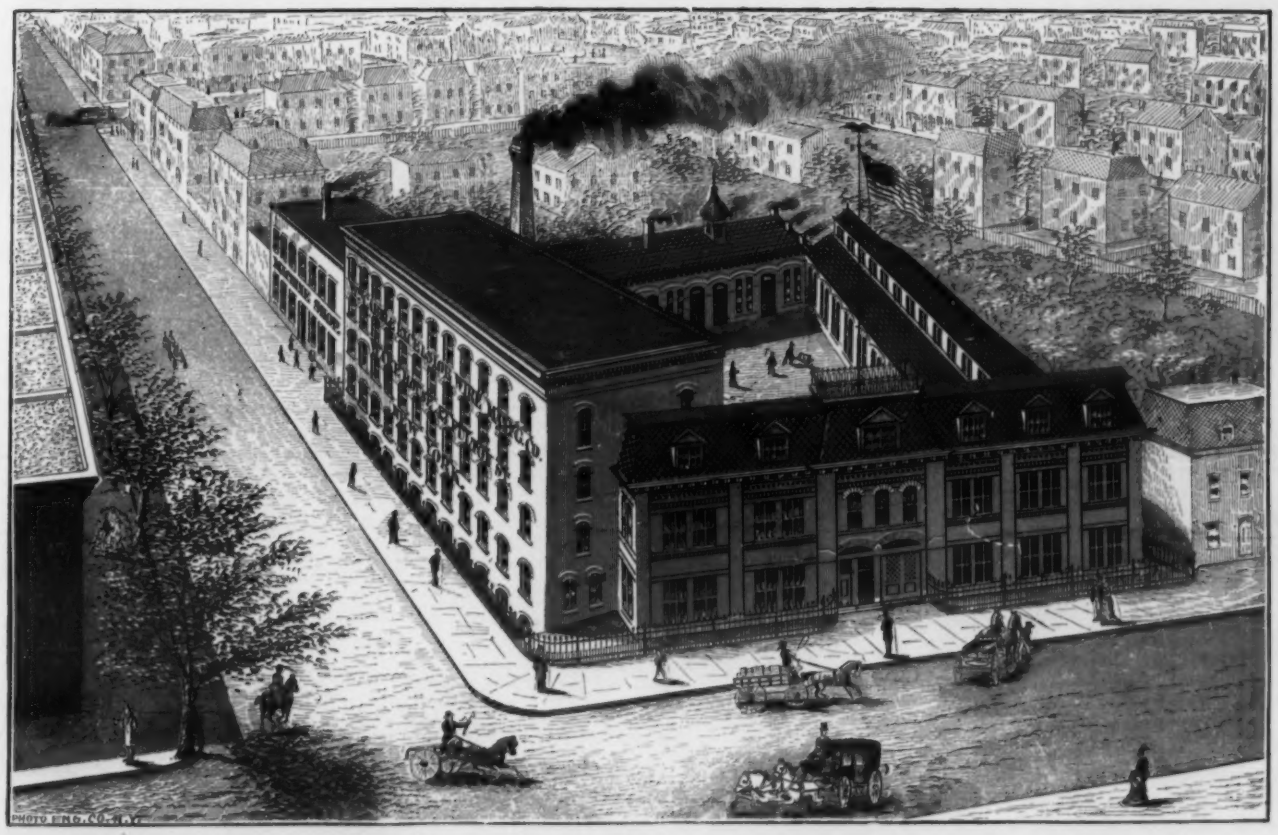

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THE MIAMI VALLEY.

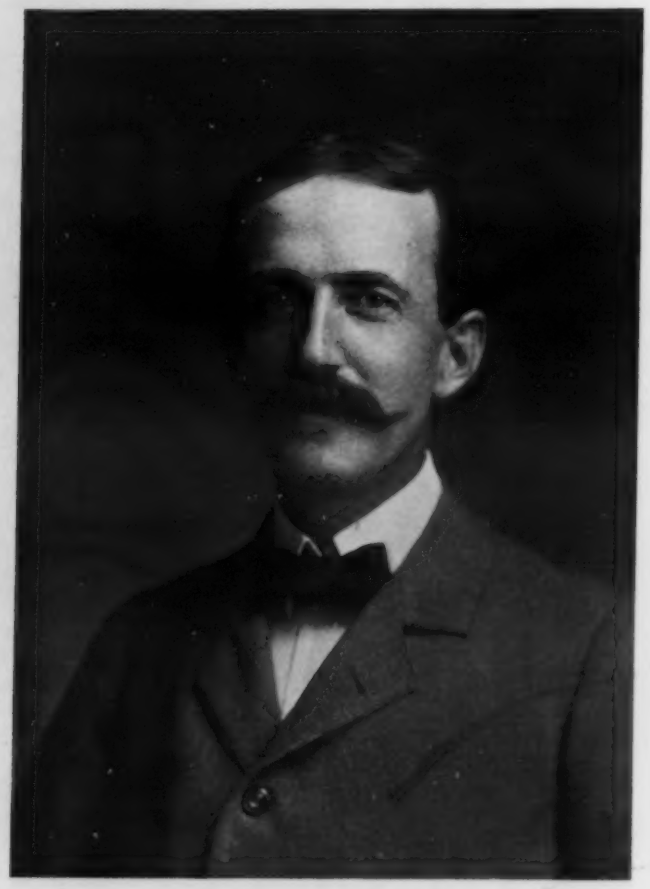
THE HISTORY OF PAPER MANUFACTURING IN THAT DISTRICT.

Early Mills—The Beginning of Many of the Present Plants—The Great Variety of Paper Made in the Valley—The Men Who Were and Are the Leaders in the Industry—Changes Which Have Taken Place.

By BENJAMIN F. REIST.

Sweet smiling village, loveliest of the lawn.
Thy sports are fled and all thy charms withdrawn,
Amidst thy bowers, the tyrant's hand is seen,
And desolation saddens all thy green;
One only master grasps the whole domain
And half a tillage stints thy smiling plain.

COMPARISONS have by some one been termed odious. Unless accepted broadly they are apt to be so, to some at least. It is sometimes difficult to trace comparisons, voluntarily made in your mind, and yet there must be points in common. There is no intention whatever to compare the Miami Valley to Goldsmith's "Deserted Village," yet with a personal acquaintance with that locality for almost twenty years I feel justified in saying that the palmiest days of the valley are past, and a retrospective consideration of this subject recalled to my mind the above quotation. Undoubtedly some will take issue with me on the above statement, but I have no desire to argue the question. The valley has, and has had for many years, almost half a century, a large production, but I believe from the time that Michigan and the Fox River District became a factor in the market the importance of this locality began to wane. Distinctly do I remember the time when exceptions were taken by mill



BENJAMIN F. REIST.

owners to placing it second to Holyoke, claiming, and with reason too, a more varied and greater product.

The cause? Well, having a decided preference to deal in facts as much as possible I must decline to express more than a brief opinion. It is hardly attributable to management; more I should say to a cause over which there was no control. The aggressive policy of the East, supplemented later by an able support from the Northwest and North, placed the valley literally between the devil and the deep sea. Products were increased more rapidly outside the valley, occasioned largely by natural advantages, which of course necessitated larger markets, until the valley found her competitors at her very doors. The mills have always shown a proper up-to-date spirit and have taken apparently all proper precaution to offset the declining prices by improving quality and increasing production.

It was the intention to submit a brief outline of the history of each mill in the valley, but inability to secure all the necessary data leaves this effort in a very imperfect condition. Errors and omissions are entirely unintentional, and I hope to be pardoned on the plea of ignorance. All evidence seems to indicate that the first mill of the valley was that of the Graham Paper Mills, located about 5 miles below Hamilton, on the Miami River, owned and operated by the father of B. B. and H. B. Graham, of St. Louis. It was run by water power, and produced "writing, ruled and unruled, printing," and what in those days were called "bonnet boards, white and blue lined, and wrappings." Truly a most varied production, one calculated to care for the demands of almost any market. This mill was operated some sixty years ago, and must therefore antedate the earliest positive date I have by about ten years.

Unable to call up the mills in the order of their dates of organization, I will take up the valley at Dayton, its northern terminus, so far as paper production is concerned, and follow the river south to Cincinnati, the southern limit. One of the best board mills in the country is located at Dayton, being now part of the American Straw Board Company, and operated under the personal management of Charles Whealen, who has been closely connected with it since the beginning. This mill was built in 1863 by William Clarke and Calvin L. Hawes, and was known as the Clarke & Hawes Company, until the withdrawal of Mr. Clarke some time previous to his death; then as the C. L. Hawes Company until it was merged into the present organization. At the time it was built it had four machines, capable of producing a yearly product of about 1,200 tons, valued at $90,000. To-day the capacity is about 9,000 tons, and worth about $150,000. Paper manufacturers have had a tendency to take a decidedly pessimistic view of their line, and regard theirs as the only trade depressed. There are others.

In 1885 Lewis Knerr, who had previously been associated with the C. L. Hawes Company, built a mill at Dayton making binders' board, with a daily product of some 6 tons, and he has operated the same ever since in his own name.

One of the oldest names connected with the paper industry is that of Mead. In 1848 the Dayton Paper Mills took their start under the name of Ells, Claflin & Co., Geo. D. Claflin being the practical man. Until 1856 this firm continued as owners. They then sold the plant to W. A. Weston, J. L. Weston and D. E. Mead, operating under the style of Weston & Mead. This arrangement lasted two or three years, when Col. D. E. Mead acquired the interest of W. A. Weston, and the name was changed to Mead & Weston, and so continued until 1866, when Thos. Nixon purchased Mr. Weston's interest and the firm style was changed to Mead & Nixon. The business was incorporated in 1872 under the name of the Mead & Nixon Paper Company. In 1880 Colonel Mead bought the Nixon interest and the title became the Mead Paper Company, which it is to-day, under the management of Charles D. Mead, who succeeded his father upon his death, November 10, 1891. This mill, until early in the eighties, manufactured news largely, and was among the first mills in the West to attempt the manufacture of chemical wood pulp, but the effort was not a financial success and it was abandoned in 1882.

Thomas Nixon is yet living, and is, I think, in his eighty-first year, but notwithstanding this fact he is actively engaged in the manufacture of paper at Richmond, Ind., assisted by his several sons.

Just before the war, Geo. Rutledge, under the firm name of Rutledge & Co., built a small wrapping mill close by the Mead mill. From about 1869 to 1879 the name was Rutledge & Hall, but Hall withdrew, Rutledge continuing the business up to about 1889, when F. J. Diem, having the misfortune to hold a mortgage on the property, was obliged to take it in, much to his disgust. He operated it until the advent of the Columbia Straw Paper Company, which wanted it and got it quick. This mill has since been dismantled.

Another small mill at Dayton is that built, owned and operated by W. P. Levis up to the time of his death. "Small" would perhaps better be applied to the machine, which is a 44-inch, and was one of the hobbies of the builder. Mr. Levis was one of the landmarks of the valley during his connection with it, and he was always very positive that a wide machine could never be a success, so to-day at least four narrow machines that were his personal selection are running. This mill was built in 1873, and since the death of Mr. Levis has been the property of W. P. Callahan.

In 1892 Dayton witnessed the birth of the W. W. White Paper Company, the scheme being fathered by W. W. White and T. B. Reynolds, and it was probably the rankest case of a failure in the history of the valley. This mill had one machine and was supposed to make writing paper, the company also making tablets. The developments in 1894 indicated that the company had apparently been running a paper machine and printing press, making a suitable paper and printing it into stock and bonds, which were hypothecated at every available place. It naturally resulted in a sale of the property—by the sheriff—and a loss of several hundred thousand dollars to the original stockholders. The concern was reorganized in 1896, and is now running in good shape, and is known as the Ætna Paper Company.

The mill of the Geo. H. Friend Paper and Tablet Company, at West Carrollton, is one of the largest plants in the valley, but is not very old. It was built in 1871 by Geo. H. Friend, and at that time contained only one machine, which was run on roofing felt. To-day it has four machines, and produces book and writing. Since the death of Mr. Friend the management has fallen to the care of J. Howard Friend, who has from time to time added a sulphite plant and taken up the manufacture of both tablets and envelopes.

About the time this mill was being built at West Carrollton, W. P. Levis began the mill of the Miami Valley Paper Company at Miamisburg, a one-machine plant for the manufacture of news. He had associated with him Messrs. Shultz and Manning, who, in 1873, bought Mr. Levis's interest and continued the business until 1890, when the property was purchased and has since been operated by the Friend Paper Company, of West Carrollton. Some seven years after disposing of his interest in the Miami Valley Paper Mill, Mr. Levis returned to Miamisburg and commenced the building of the Ohio Paper Company's plant, being financially assisted in this venture by Messrs. Mays and Lyons. In this mill were placed two 44-inch machines. Messrs. Lyons and Levis only remained in this company a few years, their interest being taken by W. P. Callahan. Several years ago Matt Marr purchased a fourth interest and is now the general manager.

The Harding Paper Company, of Franklin, claims the honor of making the first sheet of writing paper west of the Allegheny Mountains. A. E. Harding was the founder of this concern and was assisted by George H. Irwin and Abram Upp, under the name of Harding, Irwin & Co. They built the mill known as the Excello, 3 miles below Middletown on the Erie Canal, having one 62-inch machine and starting it in November, 1865.

In 1873 the Harding Paper Company was organized and built the mill at Franklin. This mill was run only three years when it was destroyed by fire, but it was rebuilt again in 1880. In 1886 the Excello mill was torn down and rebuilt, for the purpose of increasing and improving the product. Perrine, Forgy & Co. began operations in 1873, and were succeeded by the Perrine Paper Company in 1882, which engaged in manufacturing manilla wrapping.

The Franklin Paper Company was started in 1875 by Death & Clutch, a combination of names rather odd, to say the least. The product was book, news and chemical wood pulp. This mill was operated by Anderson & Harding, commencing in 1890, but becoming involved has been idle since 1895.

The Eagle Paper Company grew out of the existence of an old pottery plant which was rebuilt in 1881 and started as a paper mill with two machines making book, news and chemical wood fibre. It was managed by D. B. Anderson, and becoming involved during the latter part of the panic has been idle since 1895.

The Friend & Forgy Paper Company, another one of the mills of Franklin manufacturing manilla wrapping, became involved in 1895 and has been idle ever since.

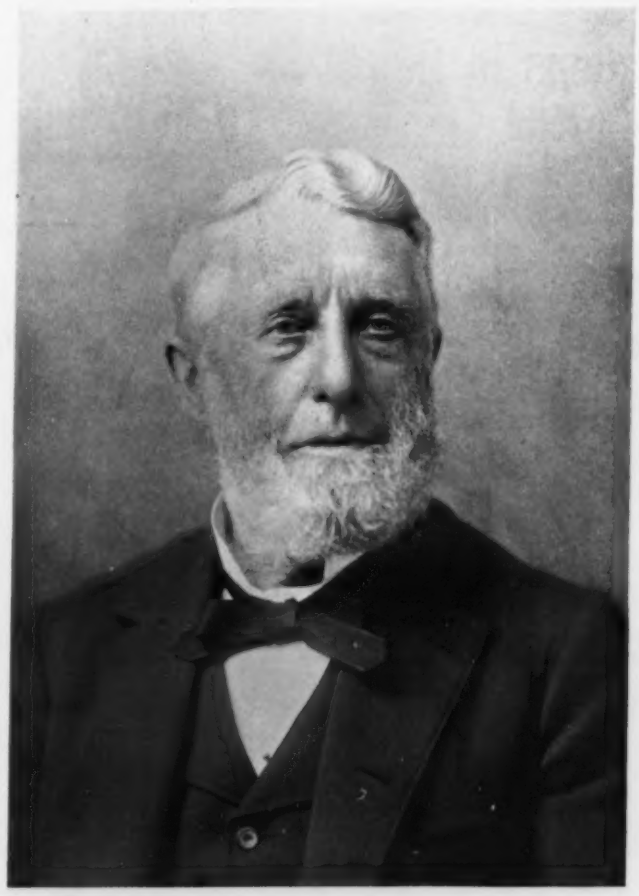
One of the most reputable points in the valley in our industry is Middletown, the bulk of the product being manilla wrapping and bags. The Wrenn Paper Company was established in 1858 by Messrs. Sutphen and Wrenn, who for many years manufactured news.

In 1868 C. H. Wardlow and J. K. Thomas built the plant now operated by the Wardlow-Thomas Company, the business being incorporated in 1895. This mill was originally built for the manufacture of manilla papers, but for some years the company has also manufactured bags and flour sacks.

The Tytus-Gardner Paper Company is the result of a consolidation of the Tytus Paper Company and the Gardner Paper Company in 1893, both mills being originally the result of the work of John B. Tytus and Colin Gardner, respectively, both of whom manufactured manilla wrapping. In 1893, with a view of fighting the paper-bag combination, this union was effected, and the making of flour sacks was taken up in addition to making paper.

As *the* manufacturer of high-grade book of the valley, the Oglesby Paper Company can probably substantiate its claim beyond any question. For many years the concern was known as the Oglesby & Moore Paper Company.

The Middletown Paper Company has had so much published concerning it in the last year that it is rather difficult to say



ADAM LAURIE.

anything additional. The plant was originally the property of A. Hill & Son.

Hamilton claims 1848 as the earliest date for paper making. In that year John W. Irwin, Jas. McGuire and R. E. Cline erected a one-machine mill for the manufacture of straw paper. A number of changes were made in the individuals participating in the ownership, and in 1874 the firm consisted of Messrs. Tweedale & Skinner, who, making the necessary changes, attempted unsuccessfully to produce tissue manilla. As a result the mill was shut down and dismantled.

Another important link in the history of the valley is suggested by the name of Beckett & Laurie. This firm was among the best known both as individuals and as a company, and, strange to say, their start was somewhat the result of an accident. The instigator of the mill was John Riley, who contracted with a Mr. Martin to build a two-machine mill, which was to have been run by Adam Laurie. The contract was made in 1848, the mill to be finished the following year. During the interim Mr. Riley, the capitalist, had some misfortune and lost all his money. William Beckett, then a young attorney, was consulted as to the best course to pursue, and after satisfying himself as to the probable ability of the mill to make money, and receiving the assurance that Mr. Laurie would remain to manage it, made the necessary financial arrangement. Soon after starting the firm became known as Beckett & Rigdon, and so continued until 1859, when Mr. Laurie became financially interested in a small way, but it was not until a few years later, at the retirement of Mr. Rigdon, that the firm name became Beckett & Laurie. This it practically remained until 1887, the only changes being the admission of the sons, Adam Laurie, Jr., and Thomas Beckett. In that year the Laurie interest was purchased by the Becketts and the Beckett Paper Company

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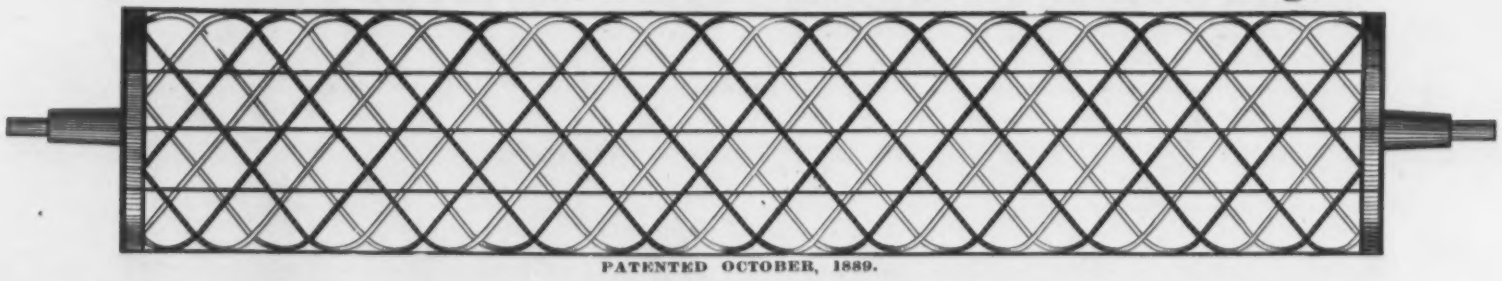

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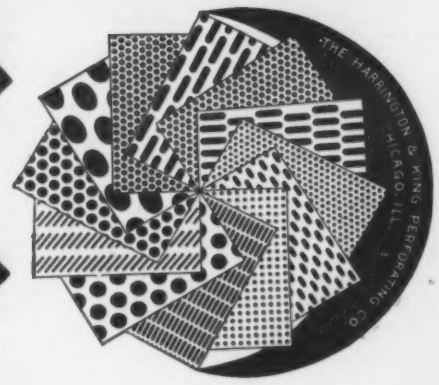

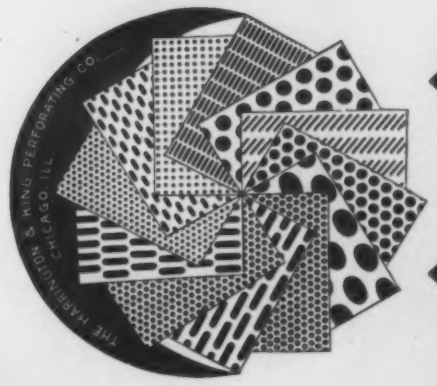

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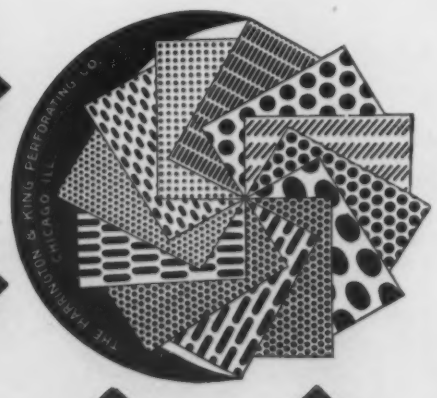

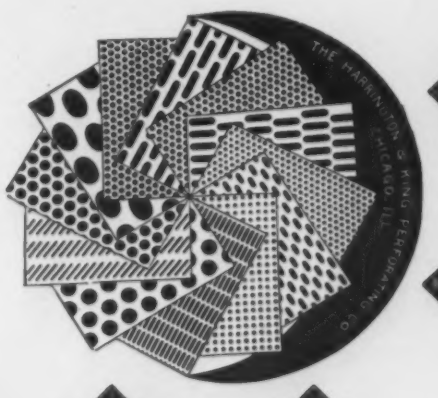

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was incorporated. It is to be regretted that more space cannot be devoted to these two names, as the subject is well worth it and interesting. We are, however, fortunate in being able to submit a fine portrait of each gentleman. Mr. Beckett has been

Col. D. E. Mead.

dead several years, but Mr. Laurie yet lives, and is hale and hearty, though in his eighty-first year. An incident which I have often heard will indicate the character of these gentlemen. Their company had a contract with the Cincinnati *Gazette* at the beginning of the war to furnish all the print needed, about 1,000 pounds daily, at 9½ cents per pound, this being the price in 1861. Before the end of the year the demand had increased to about 2,000, and the price was about 25 cents, but the contract was filled to the letter.

The founder of the well-known Snider mills at Hamilton, Louis Snider, made his first appearance in the valley, as a workman at the Graham mills, in the latter part of the 40s. In 1853 he began his first mill, called the Franklin, and operated this until 1866, when the second one, known as the Fairgrove, was built. In 1868 he admitted to an interest his three sons and son-in-law, and this organization was continued until the death of the elder Snider in 1875. The business was continued under the name of the Louis Snider Sons Company, which built the Fordham mills, and in 1892 added a sulphite plant. In 1893 this company was compelled to go into the hands of a receiver, who is at present operating part of the mill. From 1861 the Sniders had always been interested more or less in the jobbing trade in Cincinnati, St. Louis and Chicago.

For many years one of the best known and successful mills was that of the Friend & Fox paper mills, at Lockland, making everything from wrapping to book. During the last few years the mills have been partially idle, and recently the business has been reorganized as the Fox Paper Company, with Major G. B. Fox at the head. He is now busily engaged in rebuilding the Crescent mills.

The Tangeman and Halderman mills are both of long standing, and have always been identified as leading manufacturers of common papers.

For a number of years there was a mill operated in Cincinnati, until 1866, under the name of Nixon, Chatfield & Wood, and upon the retirement of Mr. Nixon, which occurred at that time, the business was continued by Chatfield & Wood.

To take the valley as an entirety, and review it from the time it became a recognized paper-producing centre, would simply be a rehearsal of a great many statements really applicable to the trade of the entire country. With only one exception, so far as I know, the mills were all built to make a much poorer quality than they are producing to-day, an extreme instance being the one making roofing and wrapping originally, which to-day is producing a good grade of book and writing. Print paper was of course the most common product, first as sheets, but necessity compelled the adoption of appliances to make it in rolls, and the fast-running, wide machines of the East and Northwest soon drove these mills to making a better paper, for which a higher price could be obtained.

As to prices, I am afraid it would be rather painful than otherwise to more than hint at the period when news was selling at 25 cents and book at 5 cents better, and yet the profit per pound was not so fabulous as one might imagine. Machines did not have the speed nor the width of to-day, and their owners must, too, have had some very serious things to contend with. I have before me a carefully compiled report now some fifteen years old, which has a strangely familiar sound. It refers to the Miami Valley, and shows in detail that super sold at 8 to 8½ cents, and wood news at 5¼ cents, rag news at 6¼ cents, straw wrapping 2 cents, and it reads as follows: "The past year in the paper business has been marked by materially increased production, reduced prices, narrow margins, and a generally unsatisfactory condition as far as favorable pecuniary results are concerned." Now has not that a familiar ring about it?—so much so that if read to you you would be very apt to credit it to some one of our numerous able correspondents, and I intend no reflection on the correspondents, as they generally submit their news as received. But to return again to this report; it says: "From the figures which are given elsewhere it will be seen that the production (of the valley) has considerably exceeded any previous year. It thus appears that during this period the increase in the quantity of paper produced was 111 per cent., and as illustrative of the reduction which has been going on in prices it may be remarked that the increase in aggregate value has been but 38 per cent." Is it possible that the gentleman who tabulated this report realized that he was writing history, and that he might be accused of plagiarism? Reading his work might some time or other cause a comment similar to the one made about Shakespeare's works by an innocent reader, who did not like them because so full of quotations.

Give your attention to the following:

"The greatest relative reduction, as will be observed, has been in news paper, the price of which has been reduced to extraordinarily low rates, the average value per pound of the production in the past year having been reduced 44 per cent. compared with ten years ago, the present prices furnishing a still more striking contrast with the high prices of the war, when news paper was worth about 27 cents per pound, showing the amazing reduction of over 80 per cent. As was indicated in the preceding report a material part of the diminished price in late years has grown out of the general introduction of wood pulp, which now enters so largely into paper production, particularly in news, which in some instances has been made almost entirely of wood, and in book, into which it largely enters. Not only in general has this results been obtained by the introduction of this new competitive agent in materials, but it has been still more largely promoted by the reduction in the price of the wood pulp itself, which lately has sold at 1⅝ to 1⅞ cents per pound, in comparison with 3 to 3¼ cents when it was first introduced."

"Mirabile dictu," here is history indeed. It is now reported that paper in some instances has been made almost *entirely* of wood. Do you note the suspicion. Some shrewd manufacturers were undoubtedly already reaping the benefits of using all wood, but their ability to do so was severely questioned, which very vividly recalls an incident not altogether inapropos. About the first visit Colonel French, of Michigan, who was one of the pioneers in wood pulp, made to the valley, with a view

Thomas Beckett.

of getting the mills to use it, I remember his meeting a number of mill men and devoting almost a half a day elaborately explaining the advantages of using this article, and I do not think he received as much encouragement as a Christian missionary would in Timbuctoo. What he did receive was an order for several tons, to be distributed among some five machines. In 1870 the valley had a product of 75 to 100 tons, and to-day it is capable of making about 250. Closely allied with the growth of the valley from its infancy, nothing has been said regarding two able assistants, the people who bought the finished product and those who supplied the raw material, and on both it was, of course, largely dependent. From the ranks of both have disappeared a great many familiar names. Of the former class, who does not remember the Charles Stewart Paper Company, at one time the most powerful paper jobber in the West, and the nursery of some very good men whose names are now prominent in the trade. Then Louis Snider & Sons, Snider & Hoole, Snider & Holmes, Biedinger & Selbert, Clarke, Friend, Fox & Co., the W. O. Tyler Paper Company, H. E. Mead & Co., et al. Among those still in the business, we find Diem & Wing, Chatfield & Wood, Brown & Stuart, Graham Paper Company, St. Louis Paper Company, and many others. To recall all the gentlemen who have in days gone by sold tons of rags, chemicals, pulp and machinery, etc., consumed in the valley would be quite an undertaking. Moreover, they are equally well known to the entire trade, and it is to be hoped that they will have frequent occasion to send many tons more of raw material for continuing the operations of the valley as an important factor in the paper trade.

In Force's "American Archives" it is stated that Thomas Loosley and Thomas Elms, in 1776, applied to the New York Provincial Congress to be exempted from military duty as indispensable to the successful pursuit of their business as paper makers.

WOOD-PULP BOARDS.

AN ARTICLE WHICH WAS PATENTED THE YEAR THE "JOURNAL" BEGAN.

Patented in 1872—Methods of Manufacture—Prices When the Goods Were First Put on the Market—The "Star" Boards Patented—Jute Boards—News Boards—The Growth of the Business.

By CHARLES D. BROWN.

THE manufacture and use of pulp boards is of somewhat recent date, and, like the use of wood pulp, has grown to such an extent that a large part of the boards in use in our country to-day for box making is made from wood.

In the year 1872 a patent was granted for pulp boards, and as it is of historical interest a copy of the patent is herewith presented. It is as follows:

Be it known, that we, Charles D. Brown and Elias B. Denison, of Portland, in the County of Cumberland and State of Maine, have invented a new and useful improvement in wood pulp; and we do hereby declare that the following is a full, clear and exact description of the same.

Our invention is especially adapted to the production of a board from wood pulp suitable for the manufacture of paper boxes, resembling those usually made from strawboard; but the board produced from wood pulp, as hereinafter described, is far superior to strawboard, on account of the beauty and purity of its color.

A decided advantage results from its use in the manufacture of boxes, over the use of strawboard, since boxes made from it require no paper lining, and because the board thus produced is thicker for weight than strawboard, and because the waste is much more valuable for paper stock.

It is well known that wood pulp is manufactured in sheets to be used as paper stock. For this purpose many woods differing from each other are used, and the pulp produced therefrom in sheets are as numerous and as various. No one of these sheets, however, is suitable to be used as box board. No one of them combines the requisite consistency, strength and external appearance. Poplar, bass and white maple are the woods ordinarily reduced to pulp for the manufacture of paper; but sheets of pulp of these woods, or woods of similar nature, although having a good color, are too soft and spongy for the manufacture of boxes. Pulp is also made from the resinous woods, such as spruce and fir; but sheets of such pulp, while they are harder and stronger, are of a dark color and warp badly.

By our invention we produce a pulp that will make a board which has the requisite tenacity, and which at the same time lies flat and has a smooth and even surface and a good color. This we do by mixing pulp produced from poplar, bass or similar woods with pulp produced from spruce, fir and other resinous wood.

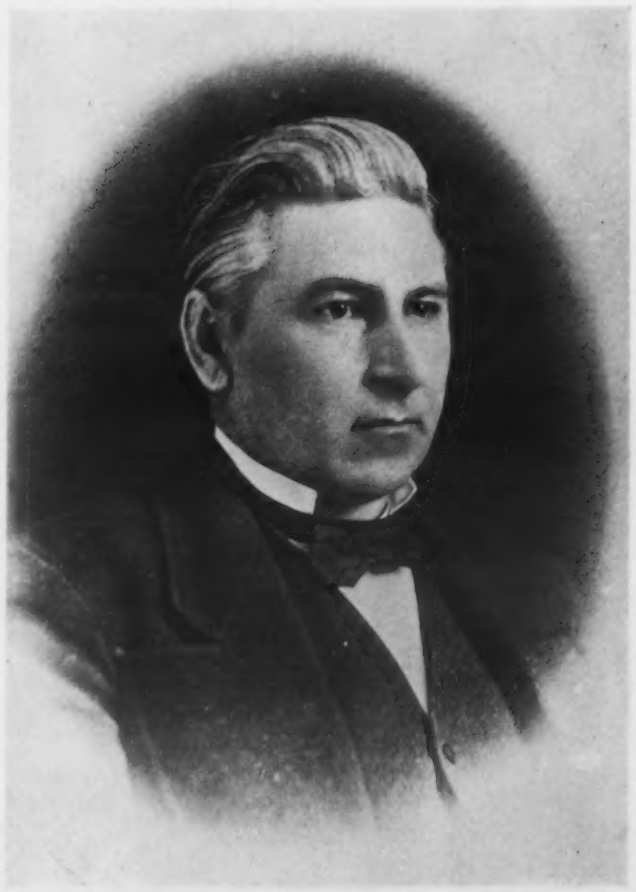
For box board we prefer to mix the two kinds of pulp in equal proportions, but pulp of either kind is improved for the purpose designated by an admixture of pulp of the other kind. Sheets thus produced have very nearly the color of sheets of poplar or basswood pulp, while the resin acts as cement and sizing.

We do not confine ourselves to any particular means of producing the pulp or mixing it, nor to any particular means of drying the pulp or forming it into sheets.

Most wood pulp is now manufactured by grinding on stone, and when it is so produced it may be properly mixed by applying to the stone, in desired proportions, blocks of the different woods, in such manner that the ground products flow away together.

We claim:

1. The process of making paper stock by grinding together



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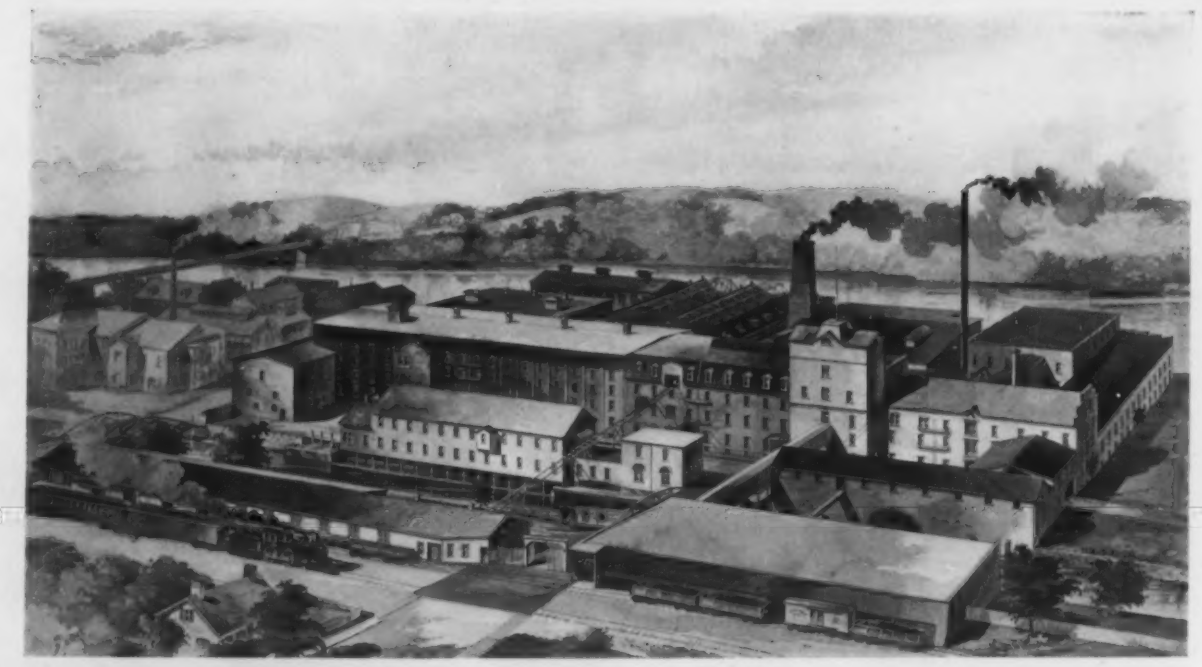

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and combining resinous wood and white non-resinous wood, the resinous wood to yield the necessary sizing, and the white wood to give the stock tone or color, substantially as described.

2. Box board made of pulp or stock from resinous woods combined with pulp or stock from white non-resinous woods, substantially as described.

At first boards were made on what is termed the "short" or "wet" machine, cut from the press rolls, put on racks and dried in a dryhouse or over steam pipes. When thoroughly dry they were moistened by running the sheets between two felt-covered rolls, the lower roll running in water. They were afterward pressed in presses similar to the old-fashioned cider presses, but later on the knuckle joint and hydraulic presses were used. After remaining in the presses until the moisture had permeated the whole they were trimmed to a size, and each sheet was weighed separately and counted. At that time all boards were made 26x38 inches in size. The first boards made in this were used by the Dennison Manufacturing Company and the George H. Dickerman Company, both Mr. Dennison and Mr. Dickerman visiting the mill and aiding by their advice in making the experiment a success.

This process was of necessity slow, and as the price of boards declined, selling first at $100 to $125 per ton, and later at $70 to $75 per ton, to expedite the manufacture "long" machines came into use with two or more forming cylinders.

About this time a patent was taken out for what was termed "Star" boards. The "Star" board had a dark, strong centre of cooked wood with both outsides of white pulp, which was a great advance, as it gave a much stronger board, which yet kept the appearance of the white or "Maine" boards.

Later on, Col. F. E. Heath, of the Kennebec Fibre Company, made a board from cooked wood, using some chemical pulp. This he called a "jute" board. It had a dark color and was very strong.

All of these are being made to-day, together with hundreds of others made by different combinations of ground wood and chemical fibres.

Recently a party has secured a patent for what is known as a "newspaper" or "blue tint" board, and which is made from

CHARLES D. BROWN.

overruns of newspaper presses and from old or folded newspapers, the ink being allowed to remain in the pulp. To-day many boards are made from this stock, clear or mixed with ground wood or chemical fibre, either soda or sulphite.

There is a great demand now for novelties in boxes, and wood pulp and papers allow so many combinations and take colors so well that there are great possibilities in connection with these materials.

The printed boards, giving perfect imitations of quartered oak, are comparatively new, and are used very largely for folding boxes for tailors' use, for suits, etc. Embossed boards of various styles are constantly coming into use, saving the necessity of covering boxes with high-priced fine papers, and the readiness with which wood pulp takes bright or made colors, under recent methods, has made a great change in the use of the old-fashioned coated boards and papers.

At one time small lots of board were imported from Germany. These were made from one kind of non-resinous wood, and were of a better color and surface than American boards, but were not equal in strength or substance, and there was not a large sale for them in this market. To-day, however, the foreigners are "catching on" to our methods, and are putting in large machines and making boards with a cooked-wood centre and white outsides, like our "Star" boards. A new mill in Norway is just putting boards of this description on the English market.

With the immense spruce forests of this country yet unexplored, improved machinery and the energy and brains given to the manufacture of boards to-day, the result must be that America will make boards for the boxes of the world, and before many years they will all, or nearly all, be made from wood or wood pulp in some form.

From a production of 1 ton in 1872 the industry has grown to nearly or quite 200 tons a day, being a large factor in the board business of the country and gradually gaining a foothold in foreign markets. Thus it has grown to be a healthy "infant industry."

THE "PAPER CITY."

THE GROWTH OF HOLYOKE AS A PAPER-MAKING POINT.

The First Mill Established There—The Water Power—The Tonnage and the Number of Machines Twenty-Five Years Ago, as Compared with To-Day—The Dates at Which the Various Mills Were Established.

BY OSCAR S. GREENLEAF.

ON March 14, 1850, the town of Holyoke was incorporated, and the first town meeting was held eight days later. In the following May the population numbered 3,718. It was not then known as the "Paper City," and indeed its growth in a way to justify that name had not even begun. Lee was the first paper-making centre then, and it was not until 1853 that Holyoke as a paper-manufacturing point began the race in which it was destined to leave Lee so far behind. In 1873 Holyoke was incorporated as a city, it having at that time a population of about 16,000 people.

The development of the power at Holyoke began in 1847, when several Boston gentlemen became interested in the matter and at the succeeding session of the Legislature secured an act of incorporation under the name of the Hadley Falls Company, the incorporators named in the act being Thomas H. Perkins, George W. Lyman and Edmund Dwight. This corporation bought the entire property and franchise of the "proprietors of the locks and canals on Connecticut River," and in 1848 completed the construction of a dam. This dam, however, was such a poor affair that when the gates were closed it broke and was swept out of existence.

In 1849 the company erected a new dam which has stood the test of time, and which is in place to-day. The Hadley Falls Company became involved in 1858, and soon afterward its river property was purchased at public auction by Alfred Smith, of Hartford, Conn., who soon afterward organized the Holyoke Water Power Company. In 1873, when the first Lockwood's Directory of the trade was issued, Holyoke contained fourteen concerns who were engaged in operating fifteen paper mills, Lee at the same time having eight concerns who were operating thirteen mills. Holyoke then had a daily capacity for producing paper of 48¼ tons. To-day it has twenty-one concerns operating twenty-six mills, with a daily capacity of 317 tons.

In 1873 Holyoke contained nineteen paper machines, three of which were cylinders and sixteen Fourdriniers, while to-day it contains fifty-nine machines, of which fifty-three are Fourdriniers and six are cylinders.

The first paper mill built in Holyoke was that of the Parsons Paper Company, a corporation which took its name from its treasurer and agent, J. C. Parsons. Mr. Parsons had been manager of the Ames Paper Mill at Northampton, and when that mill was sold he connected himself with the Ames mills at South Hadley Falls. Later he went to Suffield, Conn., where he bought out the Ames interest and formed the Eagle Paper Company, with which he was connected for six years. He then sold out his interest there and went to Holyoke, where he formed the Parsons Paper Company, with Col. Aaron Bagg as president, J. S. McElwain as secretary, and himself as treasurer and agent.

The original stockholders of the Parsons Paper Company were: Chester W. Chapin, ten shares; Whiting Street, J. C. Parsons and Aaron Bagg, eight shares each; Lucy Bagg and Cyrus Fink, five shares each; Broughton Alvord, three shares; Lorenzo Gaylord, Rufus Mather and Ethan Brooks, two shares each, and George Fowles, Lester Williams, Henry Sterns, H. D. Bartlett, John Ely, E. H. Ball and Newton Day, one share each. Two years later another mill was built, and in 1888 the Parsons Paper Company No. 2 was organized, and what is now known as No. 2 Mill was built, being devoted exclusively to the production of bond and ledger papers.

The Holyoke Paper Company was the second paper-manufacturing concern located in Holyoke. The original mill was built in 1857, D. M. Butterfield being at that time the agent of that company. Stephen Holman was agent from 1860 to 1865, when Orick H. Greenleaf bought the controlling interest in the stock and added to and improved the plant, increasing its product very largely. Mr. Greenleaf was well known to the public before he became interested at Holyoke, being the senior member of the firm of Greenleaf & Taylor, who were originally dealers in paper and paper stock at Springfield, Mass. Greenleaf & Taylor formed a company in 1853, calling it the Greenleaf & Taylor Manufacturing Company, which built a mill at Huntington in 1854 and ran it on book and news paper. Three years later the company began the manufacture of fine writing paper, and at the same time purchased the old Ames mill at the south end of Springfield, which it operated until it was destroyed by fire in 1860. In 1868 Mr. Greenleaf sold his interest in the Huntington mill and consolidated his interests in Holyoke. In 1868 I became interested in and connected with the Holyoke Paper Company, and in 1885 I succeeded the late C. H. Heywood as treasurer, and in 1896, on the death of my brother, I was elected president and treasurer of the company.

The Whiting Paper Company was organized and built its first mill in 1865. At its organization L. L. Brown, of South Adams, was president and William Whiting agent and treasurer. At present William Whiting is president, and his son, William F. Whiting, treasurer of the company. The first mill of the company, now known as the old mill, soon failed to meet the demands made upon the company, and in 1871 a new mill was erected. Mr. Whiting, the present head of the company, made his first acquaintance with the paper trade in 1858 as clerk with the Holyoke Paper Company. While in the employ of that concern he started the Hampton Paper Company, and when the change in owners of the Holyoke company took place Mr. Whiting left, and, disposing of his interest in the Hampton company, he organized the corporation which bears his name. The Whiting Paper Company and the Collins Paper Company, at North Wilbraham, which is managed by Mr. Whiting, are the largest makers of fine writings in the world.

In 1866 three new corporations were organized—the Riverside Paper Company, the Franklin Paper Company, and the Valley Paper Company.

The Riverside Paper Company was organized with Charles O. Chapin, of Springfield, as president, and James Kirkham as treasurer, and the mill was built in 1867. The property has changed hands several times, William Whiting being at one time agent and manager. In June, 1892, the Riverside Paper Company built a new mill, and commenced producing paper in it in February, 1893, making a large addition to the company's former output.

The Franklin Paper Company, which was at one time the largest manufacturer in Holyoke of collar paper, began its career with Calvin Taft as president, and James H. Newton as treasurer and agent. At the time when cloth-faced paper collars were most in demand this company not only produced the paper for the collars but cloth-lined it as well.

In 1869 the Albion Paper Company was organized, and purchased the mill which was built in 1862 by D. H. & J. C. Newton, and was run by them under the name of the Hampton Paper Company, the product of the mill being collar paper. Since that time the company has sold the old Hampton mill and built a new and much larger factory.

In 1870 the Union Paper Manufacturing Company was organized by Henry and Edwin Dickinson and J. E. Taylor, D. D. Warren being president, J. E. Taylor secretary and treasurer, Henry Dickinson manufacturing agent, and Edwin Dickinson selling agent. This concern purchased the mill of the Bemis Paper Company. The company continued in business until 1888, when it became the Connecticut River Paper Company.

The Crocker Manufacturing Company was organized in 1871, and it at once made a specialty of collar paper, upon which at that time a number of mills were running. The mill has been very largely increased and improved, and is now one of the leading establishments of Holyoke, being especially well known

OSCAR S. GREENLEAF.

for its cover and book paper. In 1872 Beebe & Holbrook began business as paper manufacturers, Jared Beebe and G. B. Holbrook being the members of the firm. In 1878 the business was incorporated.

The Massasoit Paper Manufacturing Company was originally the Greenleaf & Taylor Manufacturing Company, having a mill at Huntington. In 1868 O. H. Greenleaf, who was the agent and manager, resigned, and was succeeded by E. C. Rogers, and the name of the company was changed to that of the Massasoit Paper Manufacturing Company by a special act of the Legislature in 1870. The new company in 1872 built a mill in Holyoke, the structure being erected by D. H. & J. C. Newton.

The Excelsior Paper Company's mill was built in 1873 by Newton Brothers, and was sold to J. B. Warren and R. C. Dickinson in December of that year. Mr. Warren sold his interest to Mr. Mayo, and the firm became Dickinson & Mayo, and since then there has been a number of changes in the ownership. In 1876 the Newton Paper Company was organized and purchased the Newton & Ramage mill, which had been erected in 1873 and had been run by them under a firm name.

The Wauregan Paper Company was organized in January, 1879, although it was not incorporated until two years later.

The Chemical Paper Company was organized in 1880.

The Nonotuck Paper Company was organized in 1880, as was also the Syms & Dudley Company, which latter company sold its mill to the former in 1892.

The George R. Dickinson Paper Company was organized in 1882, the mill being built and set in operation in 1883.

The George C. Gill Company was organized in July of 1891, and was for a time known as the Chemical Paper Company No. 2, and which purchased the mill of the Winona Paper Company, which had failed.

The Norman Paper Company was organized in April, 1891.

The Linden Paper Company was organized in 1892, being incorporated in July of that year.

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THE STORY OF THEIR MANUFACTURE AND THEIR MANUFACTURER.

Nathan Sellers Relieved from Military Duty in Order That He Might Make Moulds—Extracts from His Account Books—The Many Accomplishments of the Members of the Sellers Family.

By HORACE W. SELLERS.

FOR more than half a century prior to the war of the Revolution the manufacture of paper was one of the well-established industries in the American colonies, where the state of the art, so far as we can judge, was as far advanced as in England or Holland at the same period. The scarcity of rags, then used for paper making, may have placed the mills here at some disadvantage in comparison with the supply obtainable in more thickly populated countries, but there is reason to believe that the forty or more mills then existing in the provinces of Pennsylvania, Delaware and New Jersey, besides those elsewhere in the colonies, were able to meet the greater part of the demand for paper on this side of the ocean.

It is a fact, however, that when the embargo of 1776 was raised, the country was soon confronted with a scarcity of paper, not only for writing material and printing, but for cartridges for the army.

By resolution of Congress passed July 19, 1776, the paper makers of Pennsylvania were relieved from military duty that they might carry on their trade, and the Council of Safety on August 9 following called upon the officers of the State to pay strict attention to this.

In the army a general order was issued on August 15 from headquarters, calling upon the people for paper in exchange for ready money or paper of like quality to be delivered when an available supply was at hand.

While the disorganized state of the country and perhaps the scarcity of material may have crippled the paper mills to some extent at this time, the manufacturers were certainly in want of the requisite appliances for their trade, for under date of August 26, 1776, we find recorded in the minutes of Congress:

A petition from sundry paper makers was presented to Congress and read, praying that Nathan Sellers, an Associator in Colonel Paschall's battalion, and who has marched to New Jersey, may be ordered to return home and make and prepare suitable moulds, washers and utensils for carrying on the paper manufactory.

Resolved, that the prayer of the petition be granted.

A copy of this resolution, signed by Charles Thompson, secretary, was placed in the hands of John Sellers and his son Samuel, the father and brother respectively of Nathan Sellers, and as special messengers they journeyed from Philadelphia to Newark, N. J., where they overtook Colonel Paschall's battalion on August 29. On the following day they started homeward with the following pass indorsed on the back of the copy of the above order of Congress:

The within Nathan Sellers being discharged the service agreeable to the within Resolve of Congress, He, together with his Father John, and Brother Samuel Sellers, Messengers on this occasion, having first produced the permission of the Hon'ble, the Committee of the City of Liberties of Philadelphia to come forward to this Camp, they are permitted, viz., John Sellers, the Father of Nathan and Samuel Sellers his son, to pass from hence to Philadelphia.

HEADQUARTERS, August 30, 1776.

(Signed) JONATHAN PASCHALL, Col'l.
DAN'L ROBERDEAU, Brigadier General.

We have no record of anyone else having been called upon to help the paper makers out of their difficulty at this time, and it is generally believed that no paper moulds were made in America prior to the work undertaken by Nathan Sellers in 1776. Imported moulds doubtless had been repaired, but we have evidence that in some cases at least the want of suitable materials rendered such repairs both difficult and unsatisfactory.

The early account books of Nathan Sellers contain much interesting information about the early paper makers, and the fact that orders came to him from remote parts of the country, where transportation was both difficult and costly, seems to confirm the tradition that he was not only the first but the only person engaged in mould making. It seems pertinent to the subject, therefore, to note some of the circumstances leading to his connection with the work, and which laid the foundation for a prosperous and useful industry.

At the time of the family's settlement in Darby township, in the province of Pennsylvania, in the year 1682, the business of weaving was established near the homestead known as "Sellers Hall" by Samuel Sellers, who came from Belper, Derbyshire, England. His son, also Samuel, invented a machine for twisting worsted, and became celebrated in his day as a camlet and coverlet weaver, and he in turn was followed by his son, John Sellers, who still further improved the estate, erected additional mills and developed the available water power for their operation.

This John Sellers is said to have been the first person in this country to undertake weaving wire and the manufacture of rolling screens, sieves, fans, etc., for cleaning wheat, flax and rice, although his other pursuits chiefly engaged his attention, particularly as an engineer and surveyor, in which profession he was eminent.

He took an active part in public affairs as member of the Provincial Assembly, and was a member of the Constitutional Convention of 1789, and subsequently a State senator under the Constitution then formed. Like his father and grandfather, he was a member of the Society of Friends, but was disowned for rendering assistance to the American cause during the war of the Revolution. He was one of the founders of the American Philosophical Society, and was recognized in his day as a man of high scientific attainments.

Nathan Sellers, the eldest son of John Sellers, was born at "Sellers Hall," November 27, 1751. Prior to his sixteenth year he was instructed in surveying, and in after life had frequent occasion to utilize this knowledge when serving on commissions appointed to consider canal and other improvements for the State Government. In 1772 he was apprenticed to an attorney at law to be taught the "trade, science and occupation of a scrivener," and while he applied himself diligently to his duties and subsequently practiced his profession for a time, his natural bent was in the direction of mechanics. In the year 1773 we find him giving some attention to the wire-working business, and shortly after this he apparently succeeded his father in the management and control of it.

Under date of May 17, 1776, an entry in his diary reads: "Straightening wire for paper moulds;" and on the 20th he adds: "Made hench to work moulds and beginning to lay," these being the first references we have to paper-mould making. The greater part of his time at this period seems to have been occupied in military duty, signing continental money and making priming wires (in consequence of which he forfeited his membership in the Society of Friends), and after organizing a rifle company he served as ensign in Colonel Paschall's battalion, Philadelphia Associators. Upon his recall by Congress from active military duty, as above referred to, he began at once to work upon what he described in his diary as the "Continental Paper Moulds," being engaged at the same time in repairing and making moulds for Morris Truman, Mark Willcox, R. Atkin, James Webb and others. The paper moulds here mentioned consisted of what were known as "laid moulds," each successive wire forming them being laid by hand on the frames and secured by hand twisting the cross wires that were of proper thickness to regulate the spaces between each parallel wire. To accomplish this the hard brass wire as it came from the reel had to be cut into the required length, and its set or curvature removed. This first work of drawing, straightening and laying the wire on the mould frames was carried on in an old mill on the "Sellers Hall" estate, in which building, so far as we have any knowledge to

HORACE W. SELLERS.

the contrary, the first wire was drawn in America for this purpose. For many years the original tools used by Nathan Sellers were carefully preserved, including the straightening board that he devised, the wire-drawing block made of lignum vitæ, together with the wire plates and grippers, the latter being link pincers which gripped the wire in the act of drawing it.

As to the cost of these first American made moulds, it may be of interest to note the following entries, taken at random from the account books:

Oct. 22, 1776.

Continental Congress, Dr.

	£	s.	d.
To a fine paper mould	14	12	6

Jan. 17, 1777.

Morris Truman, Dr.

To a pr. print paper moulds	6	10	0
To a pr. foolscap moulds	7	10	0

Feb. 15.

To a pr. double foolscap moulds	12	0	0

Feb. 1, 1778.

Samuel Levis, Dr.

To a pr. royal paper moulds	9	10	0
To a pr. demy ditto	7	10	0
To 6 feet 8 inches washer wire work at 22s. 6d. per foot	7	10	0

In 1778, during the British occupation of Philadelphia, Nathan Sellers's services were again required by the Government, as recorded in the following documents:

YORKTOWN, April 11, 1778.

SIR—The Honorable the Treasury Board, having occasion of another form for making paper, you are therefore, as a good Whig and sincere friend of American liberty, requested without any delay to accompany the express who takes this to you, so that you be here as soon as possible, bringing with you such tools as may be necessary. As to wire, we have enough here with us.

(Signed) Yours, etc.,
M. HILLEGAS.

Please to keep an account of your expenses, as they will be reimbursed.

To Mr. Nathan Sellers.

This may certify that Mr. Nathan Sellers, ye bearer hereof, is on his return from Yorktown to Darby township, in Chester County, and ought not to be molested or impeded on his way, having been employed by ye Board of Treasury and given evident marks of his attachment to ye cause of ye United States. (Sig.) E. GERRY.

YORKTOWN, May 2, 1778.

WAR OFFICE,
YORKTOWN, May 3, 1778.

Permit the bearer, Mr. Nathan Sellers, to pass unmolested from hence to his father, John Sellers, in Darby township, Philadelphia County, he being a loyal subject of these States.

By order of the Board. (Sig.) RICHARD PETERS.

To all Continental officers and others whom it may concern.

The following bill gives the cost of this work:

The Honorable Treasury Board

To Nathan Sellers Dr.

May 2, 1778.

	£	s.	d.
To making a fine paper mould	10	0	0
To laying 56 letters @ 7s. 6d. each	21	0	0
To cash pd. for wire	1	2	6
To do. for frames and copper	2	0	0
To expenses coming to York	6	15	9
To expenses at York	8	15	11
To 7 days coming and returning	7	0	0
To expenses to return	5	0	0
	61	14	2

It is said that while thus engaged at York, Pa., Nathan Sellers had the assistance of some of his former employees who happened to be stationed there on military duty, and who had previously served with him under Colonel Paschall. It was this work at York which doubtless gave rise to the tradition that Nathan Sellers made the paper moulds for the Government under military protection, York being garrisoned while it was the seat of the Government during the occupation of Philadelphia by the British.

That he was singled out by Congress to undertake this work was doubtless due to the fact that there was no one else in this country at the time who possessed the requisite knowledge and experience, and from the records we have of his early efforts some references may be made to work that had to be accomplished.

The imported wire was found to vary in size throughout its length, which rendered it unsuitable for making laid moulds. It had, therefore, to be redrawn and draw plates made for the purpose. In addition to this a method of annealing had to be devised, such as would avoid waste due to oxidation. This alone involved many experiments, finally resulting in the process of annealing in cast-iron annular pots, afterwards adopted in England through Nathan Sellers's correspondents there, to whom he conveyed knowledge of his methods. In this manner also the English makers introduced his improvements in the method of straightening wire for mould faces, known abroad as the "Sellers straightener," and used for many years. It was as late as 1800 "reinvented" in France. This device was one of Nathan Sellers's early improvements.

The process of straightening wire consisted of drawing it between stiff metal pins, which were fixed in a board in such a manner that as the wire passed between them it was bent first in one way and then the opposite, forming waves, these waves decreasing in size until the last bend left the wire perfectly straight. In Nathan Sellers's "straightener" the three first bends were made by pins driven into the board and the after bends by a series of small, flat steel bolts with grooves for the wire to run in smoothly, and which were adjustable by set screws to give the required number of bends. Directly in front of the last bolt was a pair of shear blades fixed to the board, so that after straightening the wire it could be cut to the desired length as it left the board.

The wire used by Nathan Sellers was imported, and much of it was of English make, from William Matthews, of Crooked lane, London, whose father-in-law, prior to Matthews succeeding to the business, had supplied wire to John Sellers for his early wire-weaving operations prior to 1773.

It is generally supposed that the early work of wire weaving in Upper Darby was by means of the ordinary beam loom, and when they came to work fine wire for mould faces they at first failed to get the smooth and even face of the imported moulds. Not knowing the English method of preventing unequal tension in the warp wires, Nathan Sellers designed the long loom in which the back beam was dispensed with, and on this the weaving was done, both for mould faces and for Flemish washers and the general trade of the establishment.

About the year 1779 Nathan Sellers removed from his home in Darby township to Philadelphia, where he established himself on Sixth street, between Market and Arch. He then formed a partnership with a younger brother under the firm name of Nathan & David Sellers. Shortly after the close of the Revolutionary War they built a larger warehouse, factory and place of residence on Market street, below Sixth, then known as 231 High street.

In 1813 David Sellers died, and subsequently the sons, Samuel and James, together with Coleman, the son of Nathan Sellers, were admitted to the partnership, the firm name of N. & D. Sellers being continued.

In the year 1817, Nathan Sellers's work being interrupted by failing health, he found it necessary to remove to the country and leave the active management of the business to his son and associates.

During his retirement he, jointly with his son Coleman Sellers, invented a wire-laying machine for making paper moulds, which was put into practical use about the year 1819. While these improvements were being perfected Coleman Sellers's two sons, Charles and George Escol, began to assist in the business and continued thereafter to be identified with it, and referring to the mould-making machine it may be interesting to quote as follows from a paper by George Escol Sellers on this subject, with which he was so intimately associated:

"Previous to that time (1819) the wire faces for paper moulds were made entirely by hand, each wire being made separately as it was to remain, forming the outer surface of the mold; the fastenings or twists of each seam were made by hand one after the other. Hence, as a labor-saving machine, the device for twisting all the seams at the same time was again in the proportion of one to the [illegible] seams in the face. For instance,

[illegible]aper C[illegible]
[illegible]ly of that year.

AMERICAN SULPHITE PULP COMPANY,

85 Water Street, Boston, Mass.

G. W. RUSSELL, Pres. *C. C. SPRINGER, Treas.*

Sole Owners of the RUSSELL PATENT LINING for Sulphite Digesters.

REPRINT OF PORTIONS OF OPINION OF COURT.

UNITED STATES CIRCUIT COURT OF APPEALS FOR THE FIRST CIRCUIT.

October Term, 1896.

No. 186.

AMERICAN SULPHITE PULP COMPANY,
Complainant, Appellant,
v.
HOWLAND FALLS PULP COMPANY,
Defendant, Appellee,

Appeal from the Circuit Court for the District of Maine.
Before COLT, WEBB and ALDRICH, JJ.

In our opinion the patent is valid and protection should be commensurate with the invention stated in the claims and the discovery and process described in the specification; and in our view ***the patent covers homogeneous structural linings composed of adhesive, acid-resisting materials in the nature of cement, which possess the required qualities described in the specification.***

The Circuit Court has found that "if the patentee Russell was entitled to his patent at all, the defendant's method of obtaining a continuous lining of cement is plainly within its scope, and it differs so unsubstantially from the method described in the patent that it has the appearance of a mere evasion, easily devised when sought for, and plainly within the rules touching equivalents." In this we fully agree, and as the results of our conclusions sustain the patent, it follows that the decree of the Circuit Court must be reversed.

The decree of the Circuit Court is reversed, and the cause is remanded to that court, with instructions to enter a decree in favor of the complainant for a perpetual injunction and an accounting as prayed for, and for further proceedings in accordance with law; the complainant to have its costs in this court and in the court below.

UNITED STATES CIRCUIT COURT OF APPEALS.
FIRST CIRCUIT, CLERK'S OFFICE,
GOVERNMENT BUILDING.

No. 186.
AMERICAN SULPHITE PULP CO.
v.
HOWLAND FALLS PULP CO.

BOSTON, July 3, 1897.

DEAR SIRS:

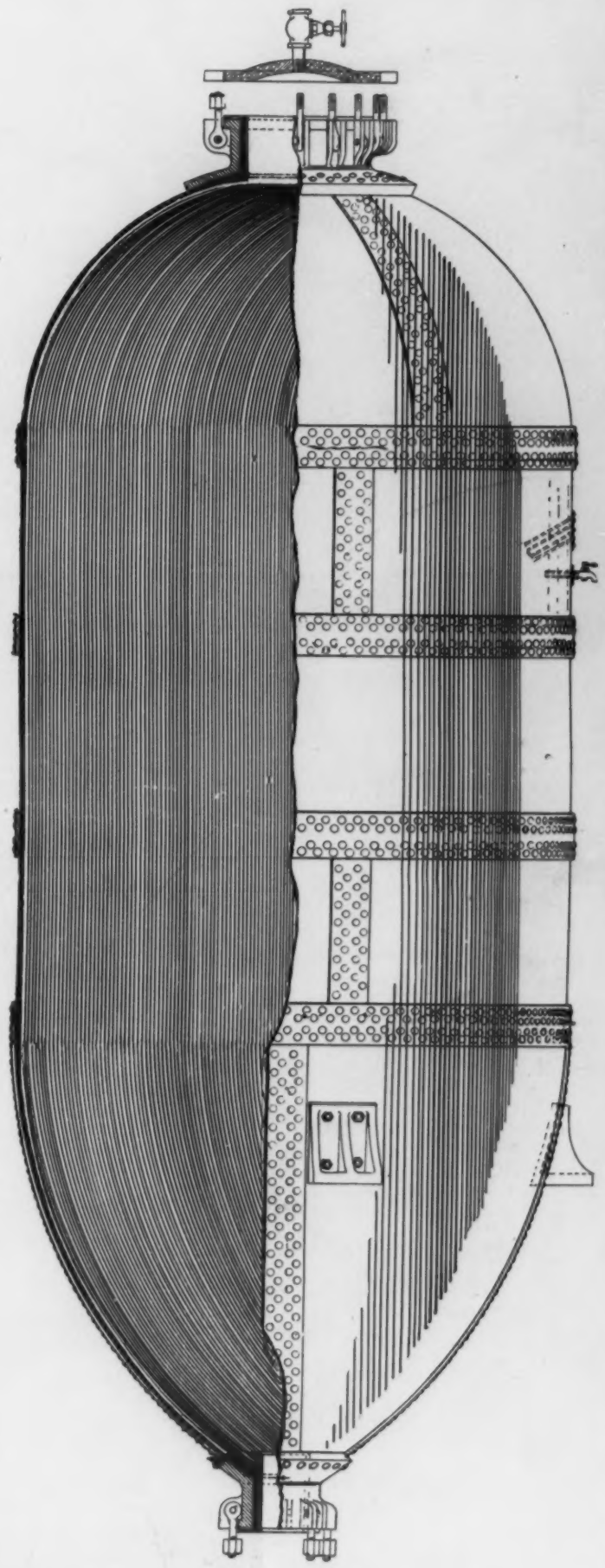
The Court entered the following order to-day:

Colt, Circuit Judge, and Aldrich, District Judge, present; Webb, District Judge, absent but concurring.

Colt, J. Petition for rehearing denied. Respectfully,

FREDERICK A. BARNARD, Asst. Clerk.

Messrs. Browne & Browne, *Counsel for Complainant.*
Messrs. Verrill & Verrill, Mr. Maynadier, } *Counsel for Defendant.*



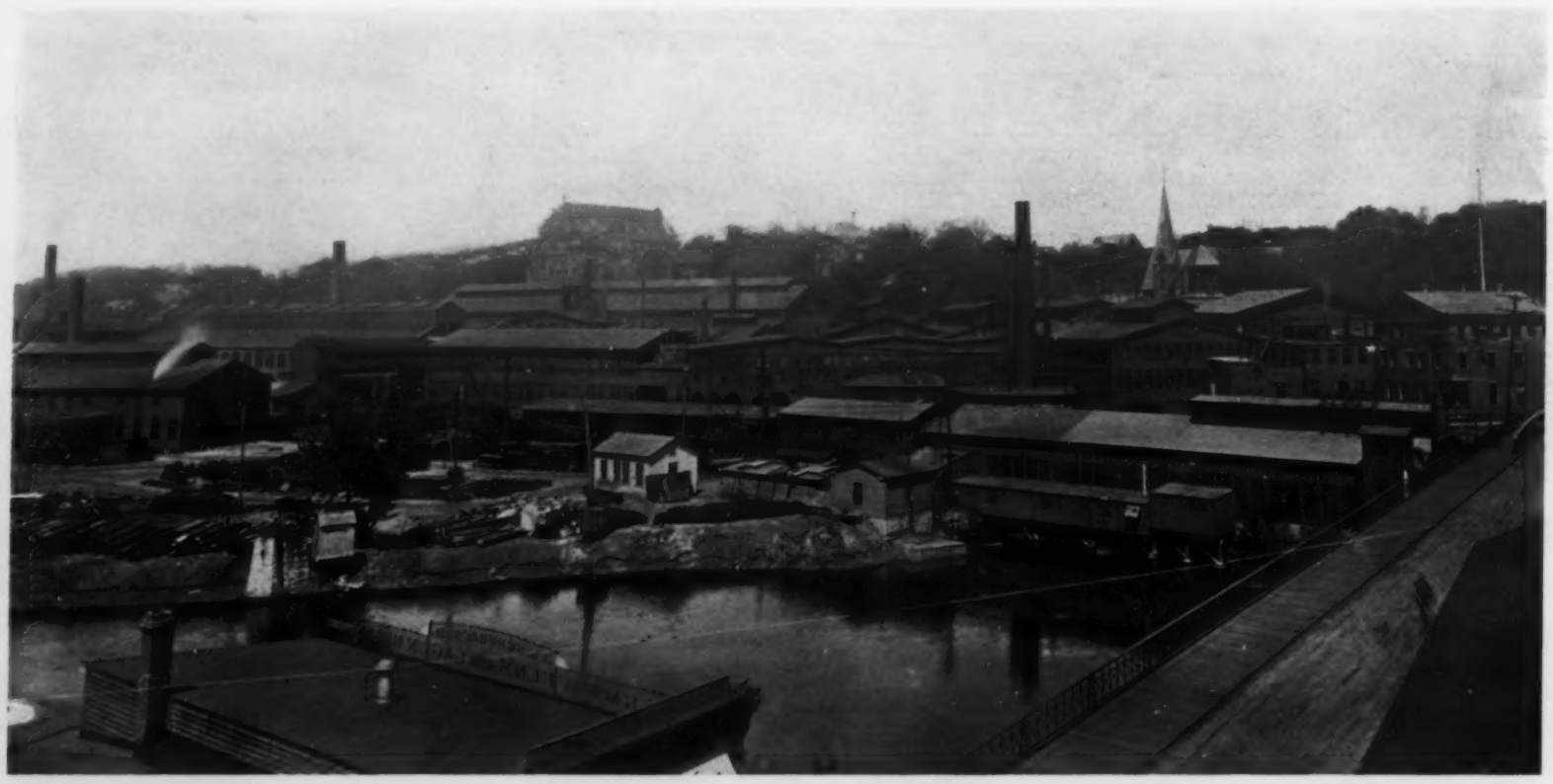
We propose to prosecute all infringers of our patents in the past and future.

American Sulphite Pulp Company, 85 Water Street, Boston, Mass.

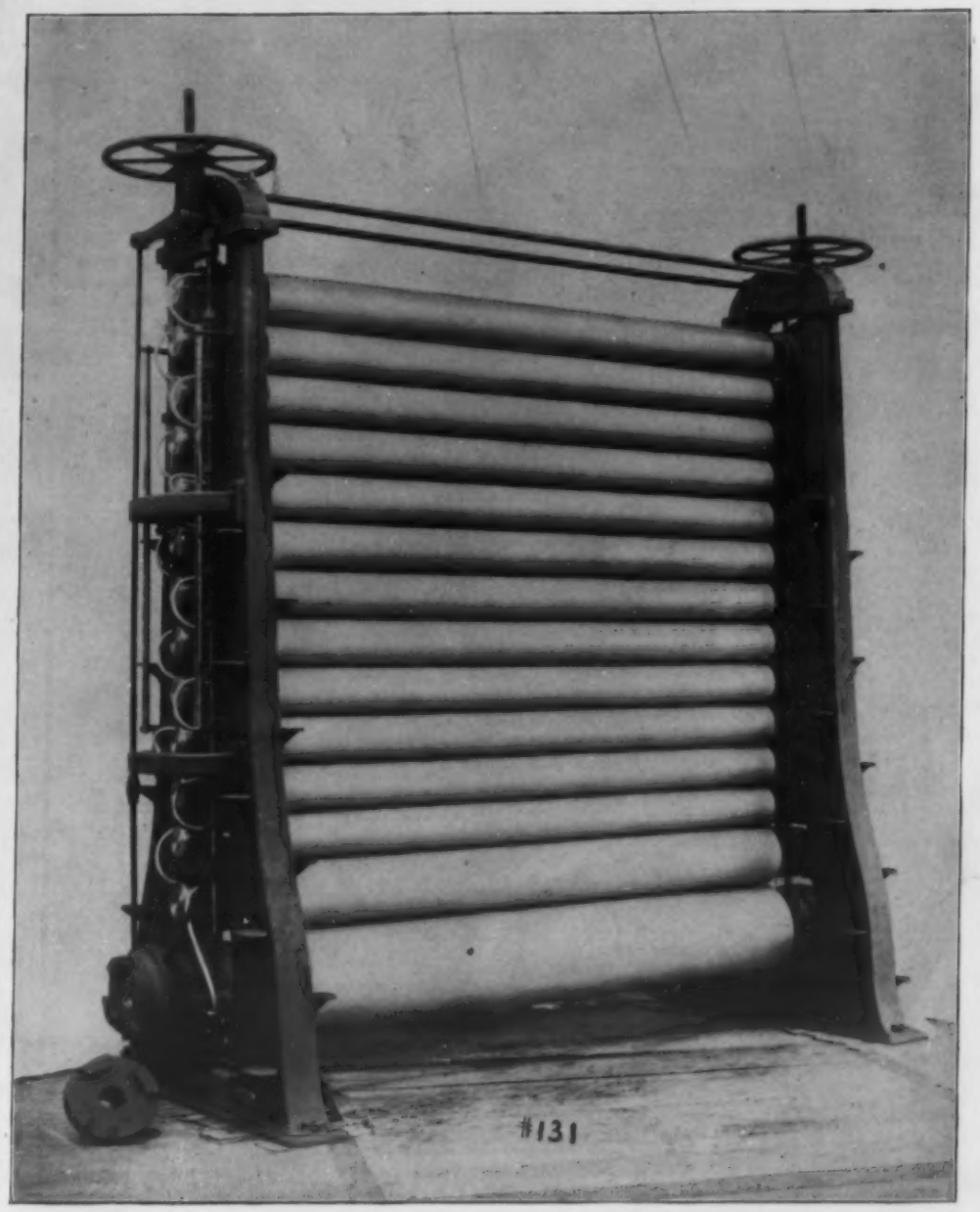
....THE FARREL FOUNDRY & MACHINE COMPANY

Ansonia, Conn., U.S.A.

Established 1848.



VIEW OF EXTERIOR OF WORKS.



ONE OF THREE STACKS OF 143-INCH FACE CALENDERS, BUILT FOR THE PUSEY & JONES CO., FOR GLENS FALLS AND PALMER'S FALLS.

THE LARGEST MANUFACTURERS OF

CHILLED .... ROLLS

IN THE WORLD.

Also Manufacturers of GRINDING MACHINES for all kinds and sizes of Rolls.

Chilled and Dry Sand Rolls

FOR ALL PURPOSES.

ROLLS BORED FOR STEAM OR CAST HOLLOW.

COMPLETE CALENDERS.

Lift Rods operated by wheels above for raising any number of the rolls.

Housings so made that the rolls may be taken out endwise through frame.

OLD ROLLS REGROUND AT SHORT NOTICE.

....THE FARREL FOUNDRY & MACHINE COMPANY

Ansonia, Conn., U. S. A.

INTERIOR VIEW OF LARGE ROLL SHOP.

The Largest Makers and the Makers of the Largest Calender Rolls in the World.

MAKERS OF THE CHILLED IRON ROLLS FOR THE LARGEST PAPER MACHINE IN THE WORLD, ERECTED BY THE RICE, BARTON & FALES MACHINE AND IRON COMPANY FOR THE RUMFORD FALLS PAPER CO., RUMFORD FALLS, MAINE. THE DIMENSIONS OF THESE ROLLS ARE AS FOLLOWS:

Face of Rolls,	- -	*156 inches.*
Diameter of Bottom Roll,	*28*	*"*
" " Second "	*18*	*"*
" " 10 Intermediate Rolls.	- *12*	*"*
Diameter of Top Roll,	*18*	*"*

Total Weight of Rolls, finished, without frames, 93,950 lbs.

This Company has recently received an order for Two Rolls, one chilled and one dry-sand, 36 inches in diameter by 154 inches long on the face, each roll weighing about 30 tons. This we believe to be the largest chilled roller ever made.

ROLL DEPARTMENT NO. 2, FARREL FOUNDRY AND MACHINE WORKS.

ALSO BUILDERS OF HEAVY MACHINERY OF ALL DESCRIPTIONS.

Shafting, Machine-Moulded Gearing, etc.

STRONG CASTINGS A SPECIALTY.

a mould for making commercial post paper has about twenty-two seams, each bar of the mould frame representing a seam. Double cap moulds have from twenty-eight to thirty bars; besides this saving a uniformity never before approached was obtained.

"The faces, being formed or woven independent of the mould frames, were laid on and secured to the under face or foundation by sewing with wire. This, about the year 1824, was the earliest work of the kind I turned my hand to. My elder brother Charles had, about two years previous to this, partially relieved our grandfather from forming the devices for watermarks and sewing them on the moulds, which up to that time, embracing a period of at least forty-five years, had been exclusively his work. The manner in which letters or other devices for watermarks were formed of plated copper wire was on blocks of hard wood faced on the end of the grain similar to the blocks used for wood engraving. On these were drawn the letters or other devices. Needle points were driven into the block and left projecting slightly above its face at every point where the watermark wire was to be bent. When the blocks were thus prepared, the silver-plated ware was held in close contact with them and wound or bent around these points until the device was formed. It was then carefully raised from the block, laid on the brass plate, the bands adjusted or squared with small hand pliers previous to sewing on the mold face. This after adjustment was necessary, as no acute angle or square turn could be made around the steel pins. It was not long before my brother improved on this method of forming the devices. He made his designs on metal plates, and used a tool like the watchmaker's small, round-handled screw-driver, notched on its end to straddle the wire to be bent; holding the handle between thumb and forefinger, the wire on the metal plate, by a simple rolling motion of the tool he could turn a perfectly square turn and follow the device with all the accuracy of the old method without requiring any after adjustment. At that time all the makers of fine writing papers were very critical as to the uniformity and accuracy of their watermarks, using such devices as arrows, dove and olive branch, Robinson's lamb, Kelter's carrier pigeon, and others more elaborate."

In addition to paper-mould making the firm of N. & D. Sellers undertook the manufacture of hand cards for cotton and wool, and the original process of setting each wire in the sheets of leather gave employment to a great many people. The practice was to give out the materials to the employees, so that the work could be done at their homes, and in this way as many as 500 men, women and children at a time were afforded a livelihood, and the firm's register of those available for the work contained over 3,000 names and addresses. In due course machinery was introduced to replace the hand process, and other improvements followed.

In connection with wire weaving and working the manufacture of rolling screens, sieves, etc., was continued, and during the transition from hand-made to machine-made paper the weaving of wire cloth for covering paper cylinders was introduced.

The firm invented and manufactured riveted fire hose and made fire buckets and mail bags, and was induced for a time to build fire engines of the "hydraulion" type of 1822.

In 1828 the firm was dissolved, the wire weaving and hose making being taken over by the sons of David Sellers, while the manufacture of paper moulds and machinery, wool cards and general machinery business was thenceforth carried on by the son of Nathan Sellers, under the firm name of Coleman Sellers & Sons.

Their business was conducted for a time on Sixth street above Market, at the corner of St. James (now Commerce) street, but having already established shops in Upper Darby, near the site of Nathan Sellers's early operations, they finally, in 1828, concentrated their entire works at that place, to which they gave the name of "Cardington."

Near this place they had previously manufactured some of their paper-making machinery to meet the demand for the "squirrel cage" paper cylinders, and the old shop as fitted up for this work was equipped with a hand-turning lathe and a small wooden shear chain-feed engine lathe operated by water power. The building was originally built for making frames for paper moulds, when that work was carried on for Nathan Sellers by one David Jones.

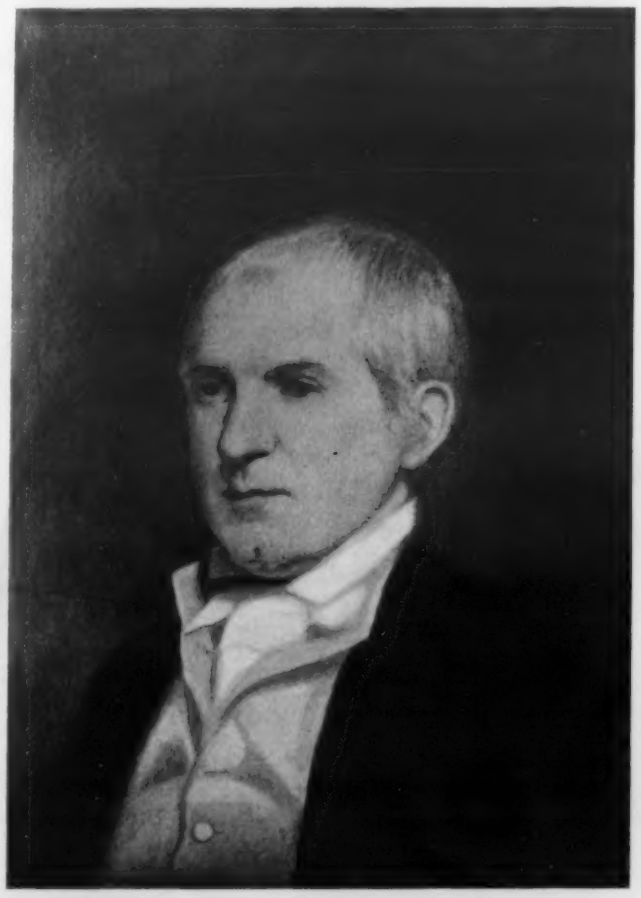
The new plant at Cardington included a foundry and machine shop, which were, in equipment, considerably in advance of the times, and in addition to the paper machinery and other products the business included work for iron furnaces and rolling mills. The lathe built by the firm for turning drying cylinders was of unusual size for those days, being capable of turning 4 feet 10 inches diameter by 9 feet in length, while it is an interesting fact that their iron planer for finishing the housings of calenders and paper-press rolls was the first one operated in Pennsylvania.

About the time these improvements were being made in 1830, Nathan Sellers, the founder of the business, died at his country place in Upper Darby, in the eightieth year of his age. His son, Coleman Sellers, survived him but four years, and at his death, in 1834, the entire business passed into the control of the junior members of the firm. Besides being the first to engage in the business of making paper moulds and paper-making machinery in this country, the mechanical skill and ingenuity of Nathan and Coleman Sellers did much to advance the art and pave the way for the greater improvements in paper making that have since been effected.

Both were earnest advocates of manual training as part of the education of children, no matter what calling they were to follow in after life, and the career of each is an example of the benefits derived from the cultivation of hand as well as brain. When Nathan Sellers retired from business he furnished over his coach house a shop where he occupied a part of each day in some useful work. It was here that he developed the machine for facing paper moulds, and would often occupy leisure hours in forming watermark devices. Referring to this habit he wrote in his diary under date of November 17, 1817:

"Variously employed. Having been through life until this time in very active and constant employment, working diligently with my hands, it has become so habitual that I cannot agreeably be without bodily employment, and indeed I doubt whether it is right for any human beings, who have bodily strength, to excuse themselves from bodily employment, from the performance of uses. The human family must live by labor, and therefore it seems a duty and cannot be dishonorable, as many erroneously deem it, and I desire always to be thankful that I so think and that I have been able to work."

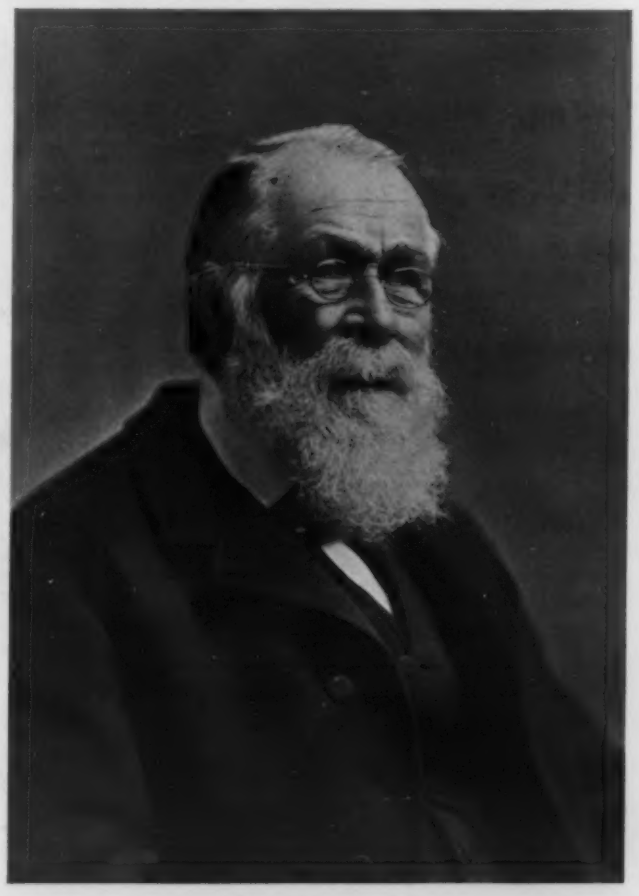
Nathan Sellers took a lively interest in matters for the public good and directed much attention to the subject of interstate canal navigation. He, with David Rittenhouse, was appointed by the State to make surveys and advise in this matter, and in one of his later writings is an earnest appeal to the State advocating a canal to Lake Erie, claiming that should New York accomplish this in advance of Pennsylvania, Philadelphia's commercial precedence must surely pass to its rival city.



NATHAN SELLERS.

While a resident of Philadelphia Nathan Sellers served for a number of years in Common Councils, and at the time of his death one of the daily papers, in commenting upon his career, adds:

"So universally was he esteemed by all political parties, all religious sects, by all ranks and conditions of people, that during the greatest time of party excitement he was elected to the City Councils without opposition, and was always reported one of the most useful and industrious members thereof."



GEORGE ESCOL SELLERS.

In 1775 the Maryland convention resolved that £400 be advanced to James Dorset, of Baltimore, he engaging to build a paper mill within six months from the date of his contract and to sell the people any kind of paper which he should make as cheap as it could be sold by any mill in the province of Pennsylvania. Dorset was to repay the loan, without interest, either in cash or in writing or cartridge paper in such proportions as the authorities directed, one-third in twelve months and the rest within two years.

NOTES ON INDIANA MILLS.

The First Mill in the State Built in 1826, Being Located on the Big Creek, near Madison.

In 1826 Isaac Mooney, who had been employed in paper mills on the Little Miami River, in Ohio, went to Madison, Ind., and he erected the first paper mill in Indiana on the Big Creek, about 12 miles north of Madison. It had an equipment of two vats. Within a year he left the paper business and the world by hanging himself. Two or three years after Mooney's death his mill was bought by Alfred McDaniels, who had a paper warehouse in Cincinnati, and who was also selling agent for Kugler, of Melford, and for Phillips & Spear, of Cincinnati. McDaniels, after a very short time, sold the mill to Hezekiah Stout, who converted the plant into a grist mill.

In 1827 a second mill was built near Madison by John Sheets, who was a native of Virginia, but who had been living in Warren County, Ohio. This mill was a two-vat plant, and was located on Indian Kentuck Creek, 7 miles east of Madison. In 1832 a machine from Brattleboro, Vt., was put in the mill. In this mill were made the first air-dried binder's boards made in Indiana, they being produced before 1830. Later the mill became a grist mill.

Leeds, Jones & Bissell built a one-vat mill at Richmond, Ind., in 1831, but before the mill was started Mr. Bissell retired from the firm. The mill had one 125-pound beating engine, and in 1835 another vat and a second engine were added. In 1836 a wet machine was put in, and in 1841 a fire dryer. In 1837 Leeds & Jones sold the mill to the Trade and Manufacturing Company, a corporation which they had organized, and when that concern failed in 1842 the mill was purchased by a firm composed of Dr. J. R. Mendenhall and Thomas Newman. Two years later Newman died. The business was carried on by Dr. Mendenhall until 1852, when he admitted Charles Nixon to a partnership, the firm style being Mendenhall & Nixon. In 1855 Mr. Nixon bought Dr. Mendenhall's interest.

Between 1835 and 1840 a third mill was built by James Hamilton and Henry Jackman near Madison, Ind., on the same creek where Sheets's mill was located. It was operated for three years on wrapping paper, and was then abandoned.

In 1848 Dr. Mendenhall built the second mill at Richmond. It was a small plant, was run on wrapping paper, and later was owned by Charles Nixon. It was abandoned in 1865. The next mill in Indiana, following the first mill at Richmond, was the Spier mill at Brookville, Franklin County, the mechanical part of which was removed from Cincinnati in 1834.

Next to Brookville, in point of time, is Indianapolis, where, in 1838, William Sheets and Daniel Tondes built the first paper mill. They operated it in partnership until 1842, when Mr. Sheets purchased his partner's interest. In 1866 he sold the machinery, which was removed to Illinois, and the mill building was converted into a cement factory.

Daniel Tondes, Sheets's partner, built the first paper mill at Lafayette, Ind., in 1841, the first paper made at it being put on the market in November of that year. In 1842 Tondes sold an interest to Wilson, Hanna & Barber, who operated the plant for eight years, when Mr. Barber sold his interest to his partners. This mill was run on writing, print and wrapping paper. Hanna & Wilson built another mill, the product of which was print and wrapping papers. This mill was burned in 1857, but the first one survived until 1874.

The second paper mill at Indianapolis was erected by Thomas McIntire and Jeremiah McLane. One is lost to imagine just why they engaged in paper making when it is stated that at the time they formed a copartnership the former was superintendent of the deaf and dumb asylum at Indianapolis and the latter was a silversmith.

About 1862 William Braden & Co. erected a wrapping mill on an arm of the canal at Indianapolis.

In 1846 George Robertson built a paper mill at Delphi, Ind., and two years later he admitted E. Rinehart to a copartnership, the firm style becoming Rinehart & Robertson.

In 1849 the mill was burned, but was rebuilt in 1851 by Rinehart & Wood. When the mill was ready to be started Mr. Wood, who had evidently lost his interest in paper manufacturing, sold his interest to A. H. Bowen, and the firm became Rinehart & Bowen. This firm operated the mill until 1864, when the firm again changed to Rinehart & Robertson, Mr. Rinehart becoming sole owner nine years later. This mill was run mainly on wrapping and news.

In 1853 the second mill at Delphi was erected by Robertson & Wood. Its second owner was Henry Griffis, who afterward sold it to A. H. Bowen, who, as mentioned, was interested in the first mill built at that place.

In 1859 Beckett & Gridly built a mill at the same place. It contained four engines and a 62-inch double cylinder machine. Both of the owners were spiritualists, and while the mill was under construction they held nightly séances, at which they claimed they were instructed as to the location of the various parts of the equipment. Notwithstanding the alleged superior knowledge under which the mill was carried to completion, it proved to be an utter failure. During the next year the mill was destroyed by fire.

The first paper mill at Elkhart, Ind., was built in 1850 by E. R. & C. Beardsley. It was located on Christiania Creek, and contained a 56-inch cylinder. Six or seven years later another mill was added, both mills being covered by the same roof. Later a new machine, a 62-inch cylinder—was put in and was run on print paper, the other machine being used exclusively for the production of wrappings. The mills in 1868 passed into the hands of the Elkhart Paper Company, by which they were enlarged and improved.

The first mill at Logansport, Ind., was built in 1857 by William Aldrich & Son, the machine being built by Nash & Richardson, of that town. James L. Baldwin purchased an interest in the business shortly after the mill was started, and within a year he became sole owner. The mill made print and wrapping paper. Mr. Baldwin operated the mill until 1868, when it was dismantled, the machinery being sold to Wisconsin people, while the building was transformed into a distillery, being a change from the rule, which held good in many cases, where distilleries were changed into paper mills. There was a second mill near Logansport, owned and operated by Eldridge & Bachmann.

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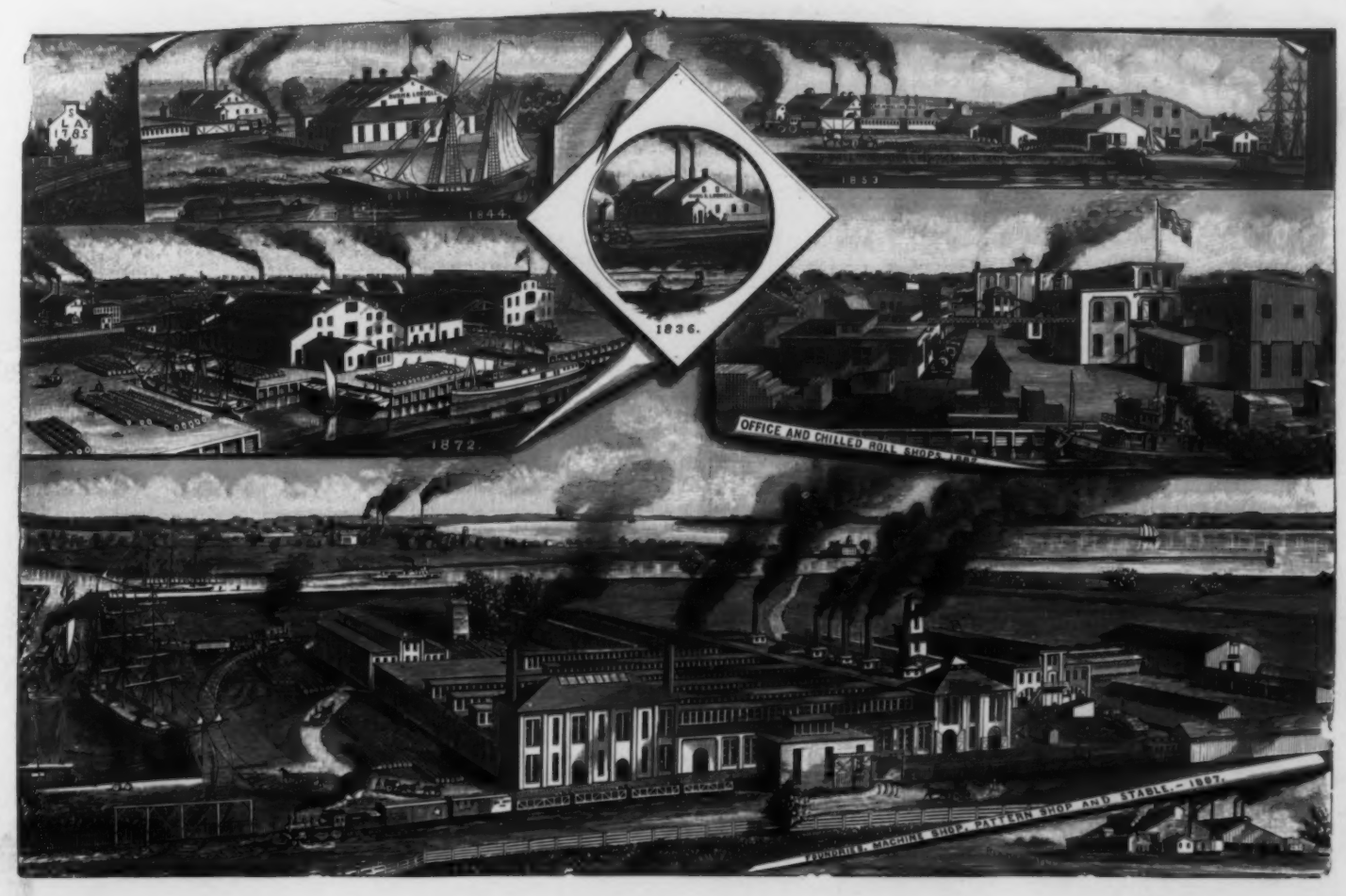

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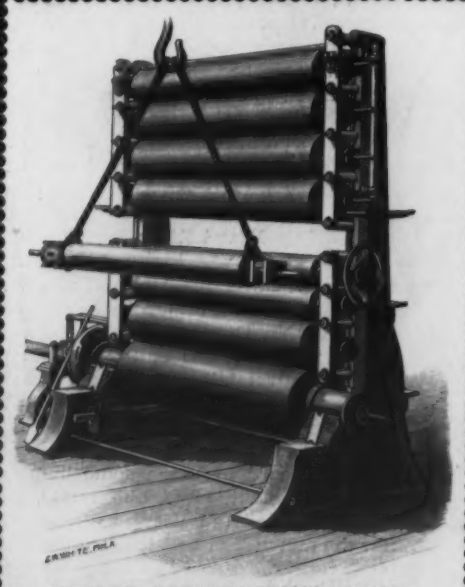

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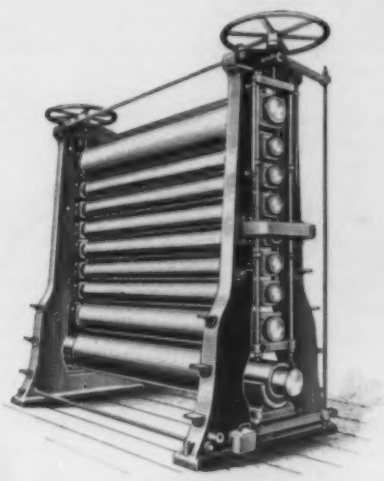

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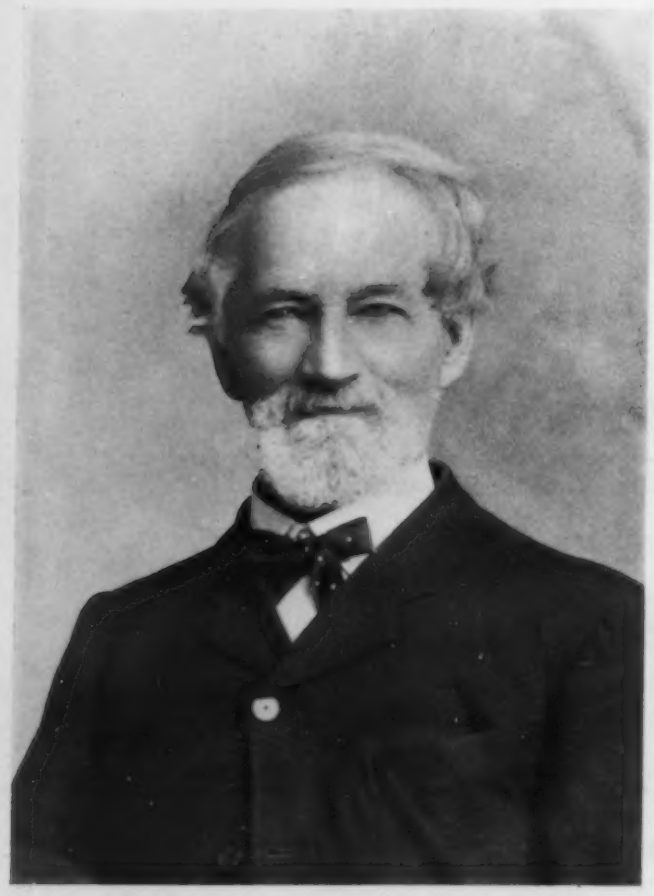
PAPER MAKING IN UTAH.

PAPER MANUFACTURED BY THE AID OF BRIGHAM YOUNG.

The Hand Mill Equipped with Borrowed Machinery—The Machinery Had to Be Returned and the Paper Mill Ceased Operations—The First Machine Mill—A Well-Equipped Plant—Burned in 1893—No Paper Mill Now in the State.

By THOMAS HOWARD.

MY ancestors, both maternal and paternal, as far back as I have any knowledge of them, were all in some way connected with the manufacture of paper. So it seems only natural, as I was born in the old country and reared under old-country influences, that I should follow in their footsteps. However, when I left the home of my ancestors and cast my lot with the pioneers of the far Western part of the New World, I not only expected to leave behind me the graves of my forefathers, but also to give up the cult which had been practiced by the family for generations. Events, however, will show that although I was placing 7,000 miles between my chosen home in the wilderness of Western America and the paternal fireside in Great Britain, yet I was not entirely able to cast off the mantle of my fathers.



THOMAS HOWARD.

I embarked on a sailing vessel at Liverpool, March 4, 1851, and after a voyage of seven weeks and three days landed at New Orleans. There I took boat for Council Bluffs, which place was reached in three weeks. Then began the tedious journey across the plains with ox teams. We reached the valley of the Great Salt Lake, October 1, 1851.

During the next month, November, the first attempt to build a paper mill was made. This project was made on Mill Creek, six miles south of Salt Lake City. Brigham Young, hearing that there was a paper maker in the country, requested me to confer with Sidney Roberts in locating a mill. Mr. Roberts had had experience in building saw mills, and had told Mr. Young that he could build a paper mill. The scheme, however, advanced no further than the mill race and a pit for the water wheel, as Mr. Roberts had neither the material nor the mechanical skill for the purpose. So this first abortive attempt was abandoned in February, 1852.

It may be observed that Brigham Young as early as 1850 advised the people to save their rags, as they would soon be needed in the making of paper, but the people at that time had scarcely rags enough to cover their bodies, so that this attempt to collect material met with little success, as will be seen a little later.

In the year following, 1853, I had an interview with Brigham Young in regard to using the machinery which had been brought to Salt Lake for the purpose of establishing a beet-sugar factory, but had not yet been put to use. To me the most valuable parts of this machinery were the hydraulic presses and the beet grinder.

Consent was finally granted to myself and Thomas Hollis to use what we could of this machinery, and also the water power then used by the shops on Temple Block, for the manufacture of paper. Mr. Hollis and I went to work and converted the beet grinder into a rag engine of 80 pounds' capacity. After making other changes in and additions to the machinery, we commenced to make paper by hand, June 27, 1854. On that day we made, so far as I have been able to learn, the first paper manufactured west of the Missouri River. It was made by hand, and was dried and bleached in the sun. We made news paper on which the *Deseret News* was printed, wrapping paper for the stores, boards for paper boxes, and what were most in demand, boards for the women's sun bonnets.

There was at that time great difficulty in obtaining raw material. Although the people had been publicly advised four years before to save their rags for paper, I found on hand when we were ready to commence operations only about 150 pounds of material. This consisted mainly of short clippings from the ends of carpet rags. We continued, however, as best we could for six months, when the sugar factory, which was being built about three miles from Salt Lake City, demanded its machinery. According to our previous agreement we were obliged to give up the hydraulic presses, etc., and thus ended paper making by hand in Utah.

Of course the paper which we produced under such conditions was necessarily of inferior quality. One gentleman remarked that the *Deseret News* looked as though it was printed on pancakes. Another remarked that he did not care how it looked, so long as he was able to read it.

This, in brief, is the history of paper making by hand on Temple Block in Salt Lake City.

In the year 1860 Brigham Young, in connection with others, purchased a 36-inch Gavitt cylinder machine in Philadelphia. This machine, with the necessary fixtures, was hauled by ox teams from the Missouri River to Salt Lake. In January, 1861, Bringham Young sent for me to convert the sugar factory, a building 40x100 feet, into a paper mill. During the spring of 1861, with the assistance of Z. Derrick, this machinery was put in place. Much of the wood work and fixtures, however, was manufactured in Salt Lake. Finally all was in readiness and on July 24, 1861, I made the first paper by machinery.

I had at this time two rag engines, each capable of taking 150 pounds of rags, and this rag pulp we thickened with waste paper. We made at that time news paper, coarse wrapping paper, a little book and writing paper, a few tinted envelopes and a few boards. We had no materials or facilities for bleaching and sizing. I managed to produce an indifferent bleach by using quicklime. My sizing for the batch of writing paper I made with a little rosin which I was fortunate enough to get hold of. My envelopes were tinted with copper, and as a mordant I obtained a wagon load of crude alum from the southern part of Utah. It could not properly be called alum. It was, rather, dirt strongly impregnated with the alum salt. It served my purpose, however, very well.

This mill continued with indifferent success until the year 1863, when the machinery was moved to the new Granite Mill, which had been built at the mouth of the Big Cottonwood Cañon, 13 miles from Salt Lake City. The mill was moved owing to the failure of the water power at the old site.

In addition to the old machinery a new 66-inch Fourdrinier machine, six rag engines, each with a capacity for 1,000 pounds of rags, a rotary boiler, together with all the recent improvements, were placed in the mill at the new site. This new mill was well constructed. It had a capacity of five tons of paper every twenty-four hours. By that time raw material had become plentiful.

A drawback which we experienced at the old Sugar House Mill was a lack of raw material. There was barely sufficient to run the machine two days a week. We depended mainly upon cotton rags, gunny sacks and waste paper. A small percentage of woolens was used in the wrapping paper, while the bulk of the woolen rags was used in making flocks for beds.

The Granite Mill continued operations until April 1, 1893, when it was unfortunately destroyed by fire. No paper is manufactured in Utah to-day.

PAPER MILLS IN MAINE.

A Brief Mention of Some of those Operated in the State between 1731 and 1845.

In 1731 Samuel Waldo, a well-known merchant of Boston and a large Maine landowner, contracted to build and lease a paper mill on the Presumpscot River in Falmouth, but, owing to the destruction of the Falmouth records by fire, information as to the matter is not very plentiful.

About the same time Col. Thomas Westbrook built a paper mill at Strandwater, also in Falmouth, but information as to this also is very meagre, although it is known that the mill was destroyed by fire.

The third paper mill in Maine was built by Robert H. Gardiner and John Savels in 1811 or 1812. The first named had come into possession of property on the Cobbossee stream through his grandfather, and he made arrangements with John Savels to go into the paper-manufacturing business. Savels had learned his trade at the "upper mill" in Milton, which was then owned by William Sumner, his uncle, who was also an uncle or great-uncle to Senator Charles Sumner. The manufacture of paper was only carried on a few months at the Gardiner mill when the plant was destroyed by fire. Within sixty days the mill was rebuilt, and the firm began the manufacture of writing paper. This firm continued to operate until 1820, when Savels purchased his partner's interest. In 1824 the firm style was Savels, Cox & Co., and later became Moore, Springer & Co. In 1836 a new mill was built on the old site by a firm composed of a Mr. Richards, who was a son-in-law of Mr. Gardiner, and H. B. Hoskins, who had been a clerk for Mr. Gardiner. The original Mr. Savels died in 1824.

George Cox & Co., composed of George Cox, Calvin Spaulding, and Glazier, Masters & Co., erected a mill on Seven Mile Brook in Vassalborough. The mill was burned in 1848 and was never rebuilt.

Harris & Cox built a paper mill in North Yarmouth, and it was run on writing and wrapping paper for about five years. The firm then failed, and the property was purchased by William Rand and Calvin Stockbridge, who operated it for about fifteen years. Then the mill was closed.

In 1816 Joseph F. Day began the manufacture of paper at Union, Me., and in 1843 the mill was burned. In 1845 Day & Lyon started a paper mill at Congin, in Westbrook, but in 1852 the mill was burned.

CINCINNATI AND VICINITY.

AN INTERESTING NARRATIVE AS TO BOTH MAKERS AND DEALERS.

Kugler's and Howells' Mills—Graham's Phoenix Mill—The Miami and Erie Canal and Its Results—The Comparative Consumption of Coal—David Parent—Some Statistics, Both as to Product and Prices—Paper Making Under Military Guard.

By A. H. CHATFIELD.

THE first authentic account of Cincinnati and its neighboring industries is in Drake's "Cincinnati," published in 1815, in which there is mention of "new and valuable paper mills having been erected on the Little Miami River." The mills thus referred to are undoubtedly Kugler's, at Milford, and Howells', at Lockport, about 2 miles above Milford, on the Little Miami River. These mills made both wrapping and writing paper, the daily product of which could not have exceeded 100 to 150 pounds. Kugler's mill was built about 1800 to 1810 by one Wallsmith, who settled in Milford, where he bought the water power at that point and erected a saw mill, flour mill, carding mill, distillery and paper mill, the remains of which are still to be seen. The flour mill, having been rebuilt several times, is to-day in operation. Mathias Kugler, who was employed by Wallsmith in the paper mill, married Wallsmith's eldest daughter, and eventually, by purchase and through his wife's inheritance, owned the entire property.

A. H. CHATFIELD.

The mill at Lockport was started by Frank Howells, who converted a flour mill into a paper mill shortly after Wallsmith had erected the mill at Milford. This mill produced wrapping, news print and writing papers, but the amount was small and the price obtained quite exorbitant—at least, judged from the present point of view.

A few miles farther up the Little Miami River Joseph Duval built a paper mill about 1815, which was in operation some years. Mr. Duval was of French extraction, and had removed to the West from Philadelphia, where his father was considered a man of wealth and influence. Mr. Duval was connected with the early history of Lebanon, near which he built his mill, and was quite famous in his day for entertaining. An annual present from Philadelphia of a "barrel of good whiskey" no doubt added largely to his reputation for hospitality.

These are the first mills erected in the neighborhood of Cincinnati of which there is any record, although some hundred miles distant from Cincinnati, at Chillicothe, about 1810, one Ingham built a mill which he called the Kinni Kinnick Mill (mixture of tobacco), after the famous Indian. The ruins of this mill are still standing.

Between the years 1814 and 1825 two mills were built in Cincinnati, one by Thomas Graham, who is credited with having invented and made the first paper machine in the West which was worked by power. This mill was a great glory to Cincinnati at the time, and caused a great deal of talk. It was called the Phœnix Mill. The building was 36x132 feet, and Mansfield's "Cincinnati," 1826, states it was run by steam. The night before the mill was ready to start it was destroyed by fire, presumably the work of an incendiary. Thus the labor of a year and the hopes of a lifetime were destroyed. The mill was rebuilt, however, several years later.

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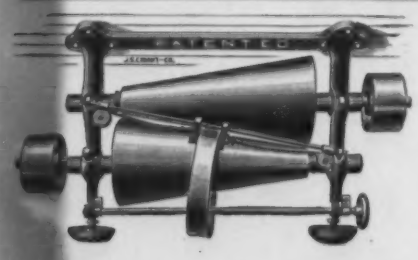

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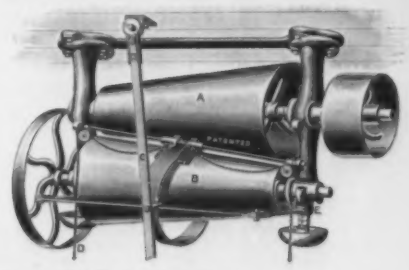

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Washburn & Moen, Worcester, Mass., Waukegan, Ill. A large number of all sizes.
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Mercantile and Contract Co., Brooklyn, N. Y. 20 sets, 2 h.p
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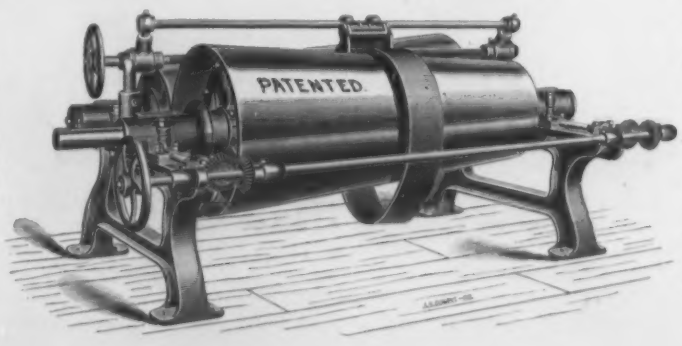
Trenton Iron Co., Trenton, N. J. 9 sets, 2 to 6 h. p.
Taunton Copper Co., Taunton, Mass. 8 sets, 2 to 6 h. p.
Cleveland Wire Mills, England. 4 sets, 6 h. p.
Stinson Bros. & Kurlbaum, Phila., Pa. 40 sets, 1 h. p.



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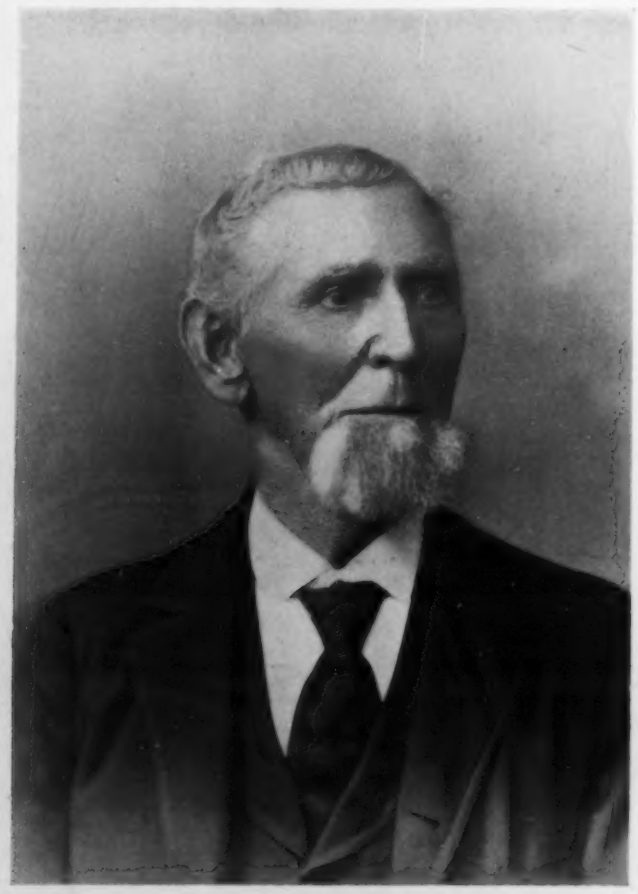
Manning, Maxwell & Moore, New York, N. Y. 25 sets; 8 sets, 20 h. p.
Sterling Dyeing and Bleaching Co., Sterling, Ct. 10 sets, 6 h. p.
Mr. S. D. Warren, Cumberland Mills, Me. 8 sets, 40 h. p.

cinnati Steam Paper Mill, owned by Messrs. Phillips & Spear, was located. This mill was also operated by steam and employed about forty hands, producing annually a "large quantity of excellent paper." The value of the product as estimated by Mansfield (1826) was $22,000 per annum.

In November, 1828, the Miami and Erie Canal was completed, but not put in active operation until March, 1829, when the first boat passed from Dayton to Cincinnati without interruption. The effect of the opening of this new waterway was immediate and inspiring. Little villages along the banks of the canal soon made their appearance, and the effect of this new commercial venture was particularly stimulating to the paper business. Mills were erected along the waterway from Dayton to Cincinnati, and with the advent of the steam railroad the Miami Valley received further impetus, so that the industry of paper making became almost the largest in this country. To the



DAVID PARENT.

Miami and Erie Canal Cincinnati owes a large part of its early growth, and it is to be hoped that the movement to enlarge and deepen the bed of the canal will reach an early fruition.

It is an interesting fact, showing the limited use of coal at this time as compared with to-day, that the total consumption of this article in 1826 was estimated at 200,000 bushels, value about $20,000. To-day one railroad entering this city ships over 800 cars daily.

One of the most interesting personalities connected with the manufacture of paper in this vicinity is David Parent, of Lockland. This gentleman, who is the son of Hiram Parent, came to Cincinnati, March 5, 1815, with his parents from Marysville, Ohio, where his father owned a farm. Hiram Parent worked in Phillips & Spears' mill, later in Graham's mill, going to Milford about 1822, where he worked at Kugler's mill. When David Parent was twelve years old he worked in Kugler's mill, his father and family removing to Duvall's Mill at this time. Young Parent remained only a short time with Kugler, preferring to work for Frank Howells in his paper mill at Lockport. At this time nearly all paper was hand made, and Mr. Parent has made wrapping, news, print and writing paper in one and the same day. The moulds and wires used at this time came from Philadelphia. Mr. Parent has been associated with the paper business since 1827, and is to-day probably the oldest living practical paper maker in the Miami Valley. He is a good talker, and some of the facts incorporated in this article are his.

The history of the jobbing trade of Cincinnati extends back to 1826, when, the business of Thomas Graham having been inherited by his sons, the warehouse of J. & J. Graham was founded. There is no space for any details in connection with the jobbing trade of this city, but it may be interesting to name the paper warehouses as they appear in the early directories:

Fisher, Armstrong & Co.	1836–37
Ely & Strong	1836–37
Butler Bros.	1846
Nixon & Co.	1846
E. O. Goodman	1849–50

During the war the paper mill owned by Chatfield & Woods was run under Federal protection, as the city was under martial law. It was necessary for the publication of the daily papers to turn out as large a product daily as possible, and with this object in view the Federal authorities took control of the property at this time. At this time news paper was bringing twenty-seven cents per pound. At this mill the first practical application in the West of the use of straw as a factor in paper making was made. It is impossible to go into a comprehensive review of the mills in operation at this time. The war ended, each mill enlarged, and in some instances rebuilt, so as to meet the increased demand for paper. All kinds of paper were made, from the cheapest wrapping to the finest linen papers. It may be interesting to the trade to compare prices of paper from 1874-75 with those of 1895. With this idea in view the following tables are submitted. Before giving these tables it will not be out of order to remind the reader that the panic of 1873 caught the paper maker and jobber, as it caught all lines and branches of business in this country, and the decline in the value of paper at this time was rapid and continuous.

	NEWSPAPER.	SUPER CAL'D BK.	MACHINE FINISH.
1874–75	9–9¼c.	13–14½c.	10–11c.
1879–80	7	10½	9
1884–85	4½–5	7–7½	5½–6
1889–90	3½–4	6¼–6¾	5¼–5¾
1895	2⅜–2¾	4¼–5½	4–4½

TOTAL OUTPUT, MIAMI VALLEY.

1874–75		49,356,400 lbs.	Value, $4,036,289.
1879–80	41 mills.	55,409,106 "	" 3,514,100.
1884–85	46 "	90,726,309 "	" 4,465,998.
1889–90	41 "	118,924,774 "	" 5,254,807.
1895	40 "	140,000,000 "	" 4,750,000.

Attention is called to the statistics of 1879–80. At this time the Southern Railroad, built by the city of Cincinnati to Chattanooga, Tenn., was opened. The immediate result was a greatly stimulated market and a demand for paper far in excess of the mills' capacity. This was known as the "boom year," and, like all history of periods of inflation, when the change came, witness what a tumble in prices and values!

E. O. Goodman was agent for Suffield's Eagle Mills, and later had his office with Nixon & Co. Nixon & Co. became Nixon & Goodman, then Thomas & Martin Nixon, succeeded by Nixon & Chatfield. Then Nixon, Chatfield & Woods, and in 1859, Mr. Nixon retiring, the firm of Chatfield & Woods was formed, which continued until 1890, when the Chatfield & Woods Company was incorporated.

THE CHICAGO TRADE.

THE BEGINNINGS OF THE PAPER BUSINESS IN THAT CITY.

O. M. Butler as a Paper Maker—He Took His Pay in Paper and Went West to Sell It—He Began the Manufacture in Illinois and Had the First Warehouse in Chicago.

BY J. W. BUTLER.

AGREEABLY to request of the editor of THE JOURNAL for a statement from me giving a history of the paper business in Chicago the past several years for publication in the twenty-fifth anniversary number of THE PAPER TRADE JOURNAL, I beg to herewith submit a condensed report made up from my own memory of it. Of course much more might be written of it, but my time and the space in your journal are too limited.

In the year 1843 Oliver M. Butler, then a young man about twenty-one years of age, having learned to make wrapping paper in a crude mill in Vermont at a time when steam dryers were not used (the paper being hung up on poles to dry), went from there to Lee, Mass., and finished learning his trade with Owen & Hurlbut by working for them one year. At the end of that time he was paid for his services in paper, which he could not dispose of to his satisfaction in the Eastern market. Hence he decided to try his luck with it in the Chicago markets. Doubtless too he had read the advice given about that by Horace Greeley, advising the young men of New England to "go West."

Mr. Butler disposed of his paper, and with its proceeds and such funds as he could raise outside of it he ordered a 36-inch paper machine with two steam dryers from a machinery concern in Brattleboro, Vt., had it shipped to St. Charles, Illinois, 35 miles west of Chicago, on Fox River, where he built and started a paper mill with a capacity of about 1 ton per day of straw wrapping paper. About that time he opened an agency in Chicago for the sale of the mill's product and to collect rags with which to make news print. His method was to make news print every fourth week, and wrapping paper the rest of the time. This amount of product was sufficient to supply this market at that time. That mill and its little store in Chicago represented the first paper industry and warehouse west of the Ohio River.

The paper business was run under the name of Butler & Hunt until 1856, then changed to J. W. Butler & Co., and in 1876 incorporated under the name of the J. W. Butler Paper Company, under which name it yet exists.

J. W. BUTLER.

The next paper house established in Chicago was that of Bradner Smith & Co., in 1856, which is yet in existence, and has done and is doing a prosperous business. The names of subsequent paper houses established in Chicago are legion, some of which still exist and appear to be substantial and prosperous, while many have ceased to exist. The paper business in Chicago has kept pace with other lines of business in magnitude. During the experience of the writer its growth has been on an average of from 1 ton per day to not less than 300 tons per day, which is consumed and distributed in Chicago.

The amount of capital invested in paper manufacturing in Illinois and the State of Wisconsin is estimated at about $50,000,000; hence if the standard of knowledge is estimated by the amount of paper consumed in the publication of literature, the Western States can make a favorable showing.

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STEAM-DRIED STRAWBOARDS.

CHANGES WHICH HAVE BEEN WROUGHT IN THE TRADE SINCE 1869.

The Economics of the Business—The First Mills to Make Steam-Dried Boards—The Pioneers of the Industry—Trade Organizations—How Prices Have Come Down—Manufacturers Must Wait for the Country to Grow.

By FRANK WHITESIDE.

To begin and write an historical sketch of the manufacture of strawboard from the time it was first made and used in this country would be only to reiterate what has been written possibly a score of times before, and also to merely bore those who are at the present time interested in its manufacture. It is unnecessary to illustrate the rapid growth and improvements made in the strawboard industry, to go back further in the manufacturing history of strawboards than the date when they began to be made and run over steam-heated dryers. And while it is questionable, in my opinion, whether the quality of strawboards in individual cases has been improved there is no question but that the generality of the product throughout the country is far superior to-day to what it was twenty-five or twenty-eight years ago. The greatest improvement that has been made (if improvement it can be called) is the reduction of the cost of production during the past twenty-nine years, as well as in the reduction of the cost of transportation from the mills to the markets of the country. Most of the reduction has come about in the past seventeen years, or since 1879. When one looks back to the time when steam-dried strawboards were first introduced to the paper-box makers, and finds them selling in our Eastern markets at $100 to $110 per ton in 1868 and 1869, and then again at $19 to $20 per ton in 1895, it seems almost incredible. Nevertheless such is the fact.

Any manufacturer of strawboards who entered the business since 1882 would almost be willing to take his oath that when strawboards were selling at $100 to $110 per ton there was at least a profit of $70 to $80 on every ton. One doesn't stop to think of the many natural causes that have developed and the many scientific appliances that have been produced since strawboards were selling at such fabulous prices, all of which tended toward the reduction of the cost of production. In 1869 the cost of making a ton of steam-dried strawboard was thought to be between $50 and $60 at the mill. The freight to market was on the average $10 per ton, and the cost of selling 10 per cent., or $10 to $11 per ton. It is true that at $100 or $110 per ton there was a large profit, which possibly amounted to $30 per ton, but the price of steam-dried strawboards never stayed at $110 per ton longer than for about one year, as you will notice further on if you have sufficient patience to read this article.

The greatest saving in the cost of manufacturing strawboards began with the general adoption of globe rotary boilers, which occurred in the years of 1880 to 1883. The open-tub system of cooking the straw was most extravagant in steam and labor, and I have no doubt that the adoption of rotary boilers reduced the cost of manufacturing strawboards fully $7 per ton. The greatest calamity that ever befell the strawboard business was when natural gas began to be utilized for fuel in the big mills that were erected in the gas belt soon after 1885 and 1886. These mills were built on so large a scale that within two years from the time they began building strawboard mills in the Indiana gas belt the business was largely overbuilt, and to-day stands, I believe, at the very head of all overbuilt industries in this country. Owing to natural and scientific causes the cost of producing one ton of strawboard has fallen from, say, $50 per ton in 1869 to $15 or $16 per ton in 1897.

As I stated at the beginning of this article, it is unnecessary to go back further in the manufacturing history of strawboards than the date when they were first made and run over steam-heated dryers. You may, therefore, treat what has already been written as a preamble to the following semi-historical reminiscent composition.

Strawboards took very little part in the industry of this country until the year 1868-69. It was at that time that steam-dried strawboards began to be a factor in the products of paper in the United States.

In the year 1869 my father, John H. Whiteside, began to turn his attention to looking up a new business, and after a few months' consideration decided to build a steam-dried strawboard mill at Champlain, N. Y., his native town. I was his oldest son then living, and his constant companion in all his business undertakings. I consequently became very familiar with all his plans, and was much interested in the then new industry of making strawboards and drying them over steam-heated dryers. The only mills I now remember as being built and running on steam-dried strawboards in 1869 were the Lebanon, Trindal Springs, and Culbertson mills in Pennsylvania; Shepherdstown and Halltown, West Virginia; Wooster, Ohio; Younglove's at Cohoes, N. Y., and Wheeler's at Bloomfield, N. J. There may have been three or four others at that time, but if so I have forgotten them.

In 1870, when the Champlain Mill was built, there were several others just then completed or being built, and the years of 1870 and 1871 saw the product of strawboards enormously increased. Among the mills that I can now recollect as coming into the market in 1870 and 1871 were the Winchester, Va.; Uhler in Pennsylvania, Dayton and Lima, of Ohio. The following year or two brought upon the market the product of many much larger mills than had been built up to that time, including the Lockport, Keeney, Quincy and Kankakee, in Illinois, and the Akron in Ohio. So prices began to yield to competition, and strawboards that were sold at $100 and $110 per ton in 1869, at $90 to $100 in 1870, and $60 to $70 in 1871 and 1872, dropped to $50, $45 and $40 in 1873, the year of the first financial panic that I remember up to that time.

All business was much depressed during the six years following August, 1873, and during those years No. 1 strawboards sold at about $37.50 and $40 per ton. It was in 1873 or 1874 that Thomas Ashton, who was then running the old Shepherdstown mill, I think, closed it, saying, "When I can't get $60 a ton for strawboards I have no further use for a strawboard mill."

In 1875 the production of strawboards in this country so far exceeded the consumption that the manufacturers began to take measures to curtail the overproduction by means of an organization. The most prominent ones in the undertaking were Col. William Denny and C. L. Crum, of Winchester, Va.; B. C. Faurot, of Lima; C. L. Howes, of Dayton; John F. Sieberling, of Akron, Ohio; John L. Norton and O. M. Butler, of Lockport; M. D. Keeney, of Rockford; R. F. Newcomb, of Quincy, Ill.; my father, John W. Whiteside; and last, but not least, that energetic, clear-headed, then king of the strawboard dealers, James E. Hayes. Mr. Hayes's office and store were then at No. 75 Duane street, and it was in his office that the organization eggs were mostly hatched.

The first organization that I can remember was formed and set in operation in 1876. This organization was in the form of a contract founded on honor between the several manufacturers, who agreed upon themselves to shut down their mills when the executive committee found it necessary to equalize production and consumption, and in no way to sell strawboards at a less price than was agreed upon. I do not remember the price that strawboard was placed at at that time, but I do remember that in August, 1879, the business depression over the country began to show signs of lifting, and while the organization made in 1876 had come to grief during the three years from 1876 to 1879, prices were anywhere between $32.50 and $37.50 per ton.

In the summer of 1879 the manufacturers got together again in organization, and, aided by the return of prosperous times, were able to advance strawboards to $60 per ton. A profitable business was secured which lasted for three or four years, prices ranging between $40 and $50 per ton until 1883, when many large mills were built in the West, and prices of strawboards reached

Frank Whiteside.

$35 per ton in 1884. In August, 1885, the Union Straw Board Company was organized, and prices gradually advanced, until in 1888 they reached $47.50 per ton for No. 1 and $45 for No. 2; but after that boards gradually declined until the summer of 1889, when the price of No. 1 strawboards was $37.50 and No. 2 $35.

On July 1, 1889, the Union Straw Board Company was succeeded by the American Straw Board Company. The first price list issued by the latter company placed No. 1 strawboard at $35 and No. 2 at $32.50 per ton, which was then considered a low figure, and much fault was found by the independent mills outside of the American Straw Board Company. Prices of strawboard remained very even at about these figures until 1891, when they advanced to $37.50 and $40, and remained steady until the panic of 1893, when they gradually declined, until they reached $19 and $20 in the winter and spring of 1895. Most all strawboard manufacturers claimed they were losing money in 1894 and 1895, and those who claimed differently, I believe, said something beside their prayers.

Anyone at all conversant with the manufacture of strawboards knows full well that at any price under $27.50 for No. 1 strawboards there is not enough money in it to make it a reasonable investment to place money in a strawboard mill. I will grant that there are some mills that can put strawboards on the track at $16 per ton. Add to this $5.50 for freight to the East; 7 per cent., or $1.92 per ton, for selling; 3 per cent., or 85 cents per ton for cash discount; $2 per ton for interest on the capital invested in the plant, and it leaves only $1.75 per ton profit. The present price of strawboards is $23 and $24 per ton in our Eastern markets. I do not wish to convey the idea that the cost of production has been so reduced as to enable manufacturers to enjoy great profits at these prices. We can waive the charge of $2 per ton for interest on capital invested, and show a profit of $1 per ton or thereabouts on plain strawboards for mills situated at points where transportation costs $5 per ton. Mills that are situated nearer the Eastern markets and whose transportation is less can do only little better, because it costs an Eastern mill some more per ton to manufacture the goods.

It is my opinion that strawboard manufacturers will have to wait for the country to grow up to the capacity of the mills before again seeing the steam-dried strawboard business a very profitable one.

THE GENESIS OF STRAWBOARD.

A Synopsis of the History of the Shryock Enterprises at Chambersburg, Pa.

The descendants of John Shryock, of Chambersburg, Franklin County, Pa., claim that he established the mills at Chambersburg as early as 1800, and that he made bank-note paper for the United States Government during the administrations of John Adams and Thomas Jefferson. He was succeeded in business by his son, George Augustus Shryock, who in 1866 published a pamphlet entitled the "History of the Origin and Manufacture of Straw and Wood Paper." He did not claim that he introduced straw paper or strawboards, but he did claim that he was the first who made them by machine. After he had carried on some experiments in the manufacture of straw paper he visited New England in the winter of 1829, and while at Springfield saw the Ames cylinder machine in operation. On his return home he stopped at New York, where he met Mr. Laflin, of Lee, Mass., whom he engaged to build a small cylinder machine for the Hollywell Mills, which machine Shryock claimed was the first ever operated on straw pulp anywhere. Within the first year he introduced the grooved wood roll for the manufacture of binder's board and box board, and he further claimed that those two distinct products embodied the first use of straw paper as a staple article of merchandise. In the winter of 1829-30 Mr. Shryock purchased a steam boiler from Rush & Muhlenburg, of Philadelphia. It was specially for cooking the straw. By the aid of the boiler from 150 to 200 reams of crown wrapping paper were manufactured in twenty-four hours. He soon discovered, however, that when the paper broke between the press rolls and a lay-boy it accumulated sometimes in six or eight layers around the press roll, thus forming a solid binder's board. The discovery of this led him to introduce a gum-wood roll instead of the top press roll with a longitudinal groove, in which the pulp was not pressed. The soft pulp being removed with a piece of wood, the board was then stripped off the roll. By that means board after board was made and laid off in packs. They were then hung on poles or spread out to dry.

On his next visit to Philadelphia Mr. Shryock purchased from Matthew W. Baldwin a superior rolling mill, and then by the effective aid of John Jay Smith he introduced strawboard into the Philadelphia market.

Feeling encouraged at the progress he had made, he decided to enlarge and improve the mill. He built a new dam, widened the head race for almost half a mile, built a new drying house, and erected an addition to the mill which was three stories in height and about 90 feet long by 40 feet wide, put in four pulping engines, fitted all the space in the second and third stories and attic for drying, and built a new steam house with three tubs, each 11x8 feet, all at an expense of about $35,000.

At that time the owners of the Hollywell Mill were McDonald & Ridgeley, of Baltimore. While visiting Chambersburg Nicholas G. Ridgeley became so impressed with the manufacture of straw paper that he constituted Mr. Shryock his agent to buy from William Magaw, of Meadeville, who had patented a process of manufacturing straw paper, the exclusive right to manufacture it in all of the United States east of the Alleghany Mountains, and the agreement was made for $26,000.

In connection with Mr. Shryock, Mr. Ridgeley arranged to put Hollywell Mill in the best condition possible, and when satisfied with the product agreed to build four other mills, one at Rochester, N. Y.; one at Paterson, N. J.; one at Chester, Pa., and the other at Chambersburg. When the improvements at Hollywell were finished Mr. Shryock's misfortunes began. There was no written contract between him and Ridgeley, and he alone had to bear the loss, inasmuch as everything was swept away by McDonald and the Ridgeley estate. All of the machinery connected with the Hollywell Mill was made under Mr. Shryock's direction.

In 1831 he received a proposition from Thomas Chambers, and they formed a partnership for the manufacture of straw paper and board at the mouth of the Fall Spring, where it empties into the mouth of the Canodocheaque. Mr. Chambers authorized Mr. Shryock to ascertain from the executor of the estate of Samuel Purbiance the selling price of the old paper-mill site which adjoined mills belonging to the Chambers estate. Satisfactory arrangements were made, and the purchase was made. Thereupon ensued a new partnership. Thomas Chambers soon after concluded to build a furnace at Shippensburg, and passed over his interest in the old paper mill, by consent of Mr. Shryock, to S. D. Culbertson. The new firm was composed of Mr. Culbertson, Reed Washington, Alexander Colhoun and George A. Shryock. One-third of the profits was to be given to Shryock, and each of the other partners was to have two-ninths. The mill was built on a much larger scale than had been contemplated by Chambers and Shryock. All of the mills on the banks of the river were leased for ten years at a rental of $2,400 per annum, and this secured for the new firm all the water rights. Donald Watson, of Baltimore, built the driving portion of the machine, and the paper-making portion was constructed by John and Philip Nitterhouse, of Chambersburg. The mill contained eight pulp engines and eight machines with a capacity for making easily 1,000 pounds of paper an hour. The main building was 150x50 feet, five stories in height, and had 200 miles of drying pole. There were seventeen large drying presses and every facility for the manufacture of boards and paper. It is said that so perfect was the machinery that, outside of felts and wires, the annual expense for repairs did not exceed $200.

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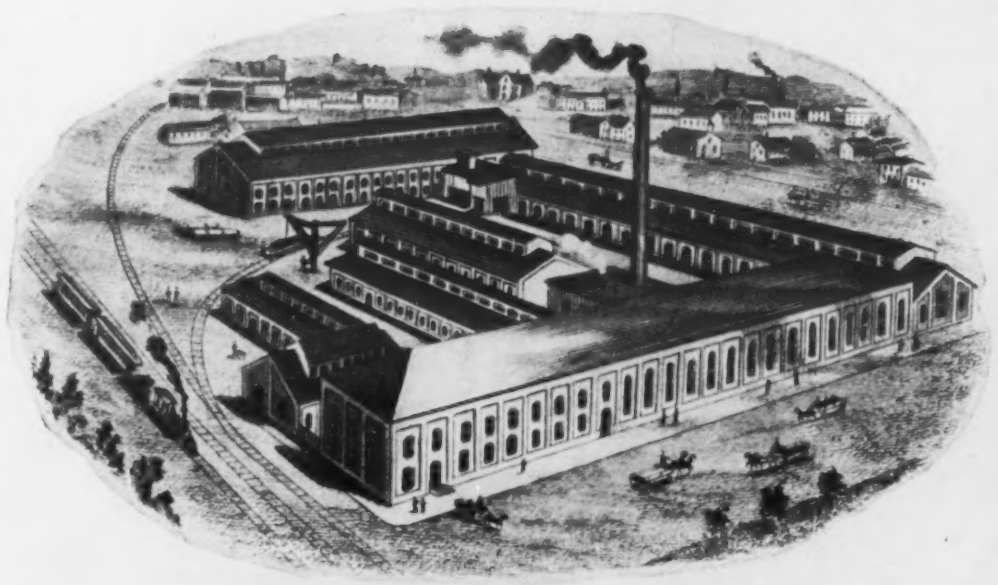
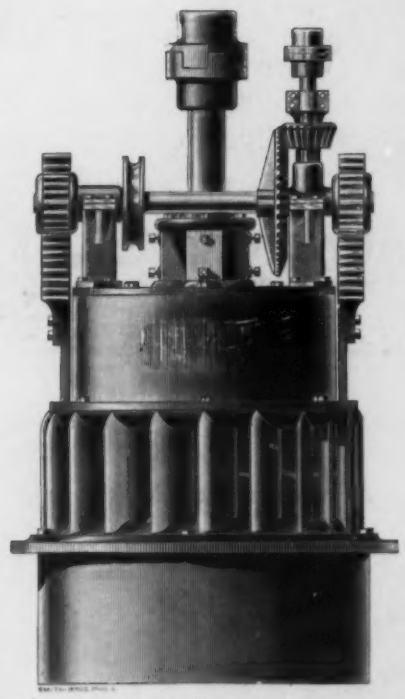


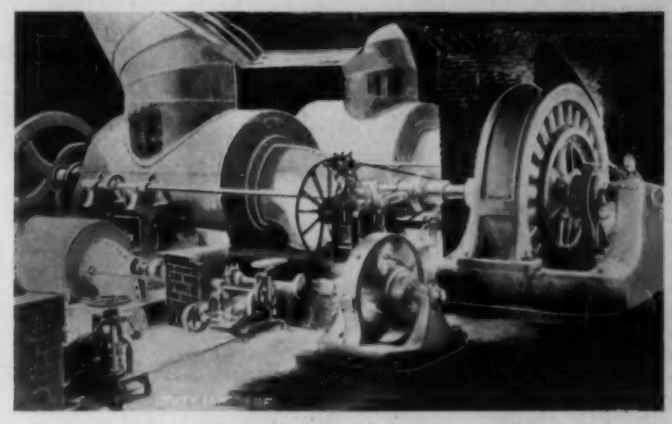
Outside view of the works of S. Morgan Smith Co., York, Pa., U. S. A.

Interior view of one wing of Erecting Department, showing Turbines in course of construction.

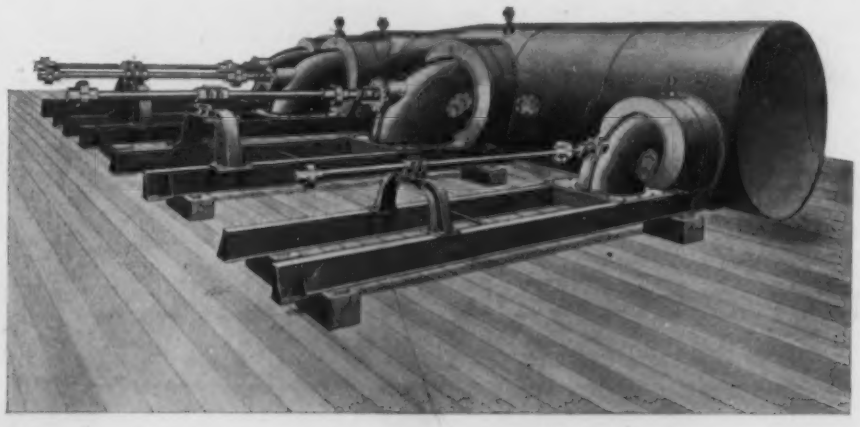
Represents two pairs Horizontal 42-inch McCormick Turbines furnished the Clifton Mfg. Co., Clifton, S. C., developing 2360 horse-power under 30 feet head. Both pairs are coupled together, and power is taken off at one end by three 10-feet diameter rope sheaves carrying 48 ropes 1¼-inch diameter. A 27-inch horizontal Turbine of 225 horse-power drives dynamo and fire pump.



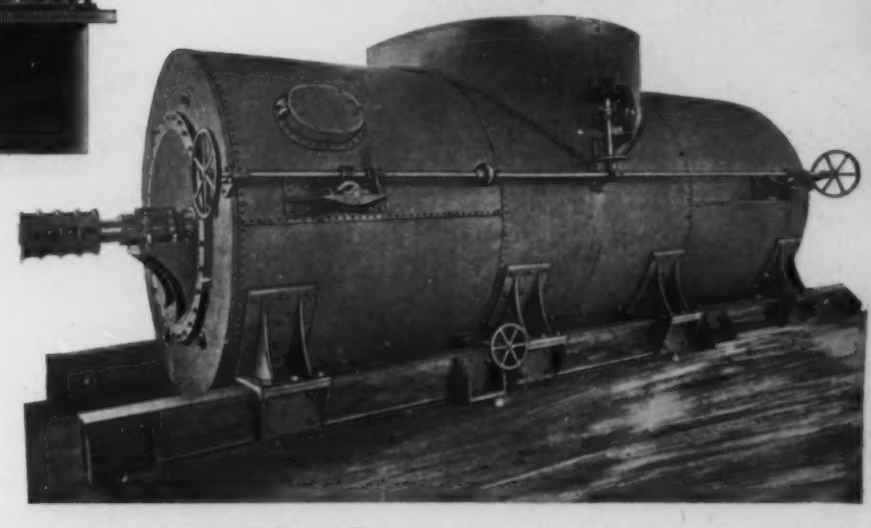
Vertical McCormick Turbine.



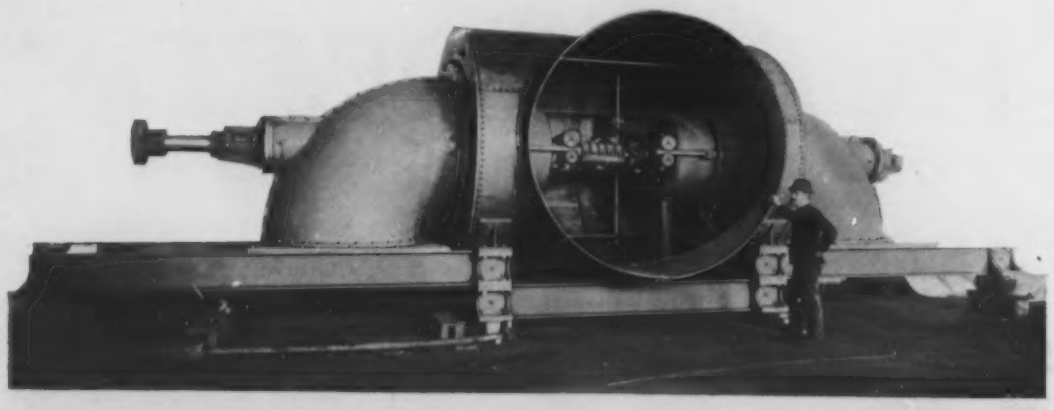
Represents two pairs 30-inch McCormick Turbines, on horizontal shafts, connected direct to electric generators. Gates are controlled by Faesch & Piccard governors. Four sets like this furnished the Sacramento Electric, Gas and Railway Co., Folsom, Cal., developing 5000 horse-power under 55 feet head. Power is carried to Sacramento, a distance of 23 miles. Now building a second outfit for them.



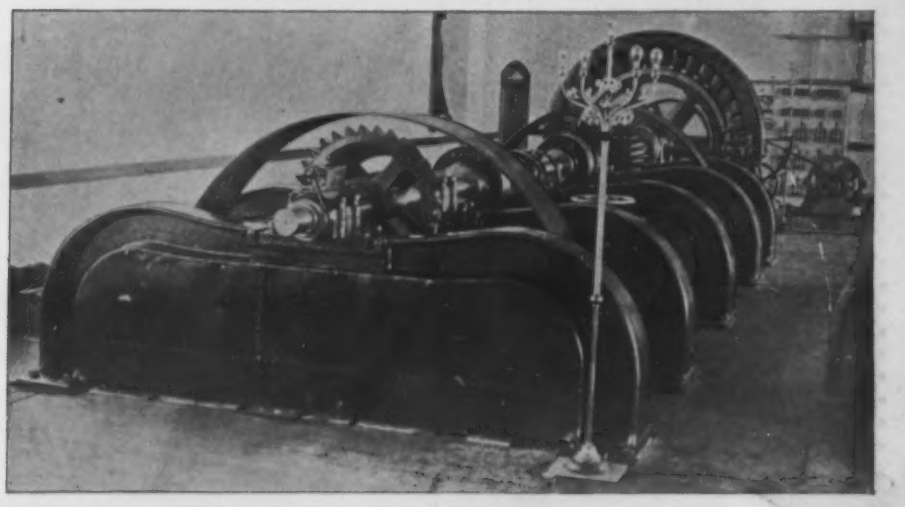
Represents two 39-inch, one 33 and one 21-inch McCormick Turbines, on horizontal shafts supplied from one feeder pipe 650 feet long, 11 feet diameter at large end, reducing in size as turbines are taken off. The two 39-inch wheels are direct-connected to four pulp grinders. This outfit was furnished the Newton Falls Paper Co., Newton Falls, N. Y., developing 2220 horse-power under 42 feet head.



Represents pair 39-inch McCormick Turbines on horizontal shaft, in steel flume, with centre discharge, furnished the Glens Falls Paper Mill Co., Glens Falls, N. Y., developing 1436 horse-power under 42 feet head. Also furnished them two pairs 33-inch, one single 42, one single 39-inch horizontal Turbines, and one vertical 36-inch, aggregating 3200 H. P.



Represents a pair of 39-inch McCormick Turbines, developing 1000 horse-power under 33 feet head, furnished the Piercefield Paper and Mining Co., Piercefield, N. Y. Also furnished same Company four pairs 33-inch, one single 27, and one single 18-inch wheel, aggregating 3850 horse-power.



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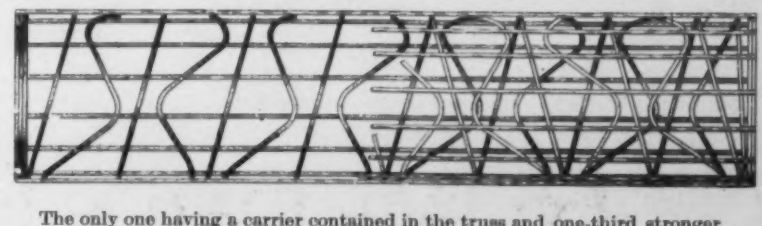

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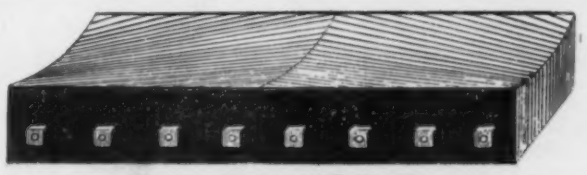

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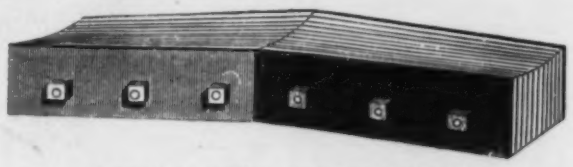

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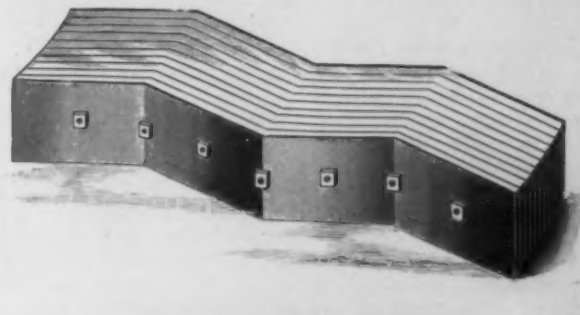

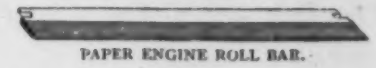

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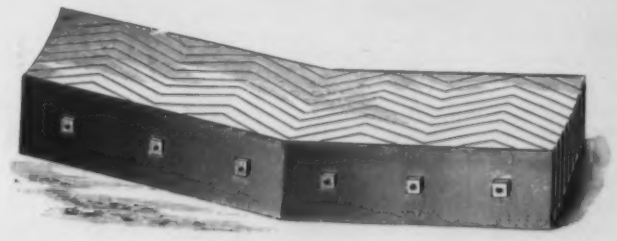

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PAPER MAKING BEFORE AND DURING THE WAR.

The Platner & Porter Mills—The Equipment—Fire Dryers—Dividends of 116 Per Cent—Crude Methods of Operation—The First Flat Folios—How Paper Was Cased—Wages and the Price of Board—The Cost of a Day's Run.

By H. H. PORTER.

TO the younger generation of paper makers working with new and perfected machinery, with plants as nearly perfect as an enormous outlay can make them, with the keen competition of mills as large and as perfect as their own well nigh everywhere, the beginnings of a famous old-time paper mill will no doubt prove of interest.

In 1847 Cyrus W. Field, then at the head of one of the largest houses in the paper trade, called to the attention of William Platner and Samuel Q. Porter, of Lee, Mass., the Stone & Carrington mill at Unionville, Conn., which was at that time for sale. Mr. Platner was a practical paper maker, a nephew of George W. Platner, of the old Lee firm of Platner & Smith, who were paper makers of established reputation, while Mr. Porter was a business man, the son of Squire Wm. Porter, of Lee. In partnership with Mr. Platner, Mr. Porter had carried on a general merchandise business in that famous old paper-making town for a period of four years. In January, 1847, they gave up their business in Lee and bought the frame mill, water privileges and machinery of Stone & Carrington for $6,000, paying down only $1,200 and agreeing to pay the remainder in installments annually for five years. They paid John Hooker, of Hartford, $2 for drawing up the papers necessary to the transaction.

It was the day of small beginnings, and the growth of the paper industry from 1847 to 1897 is well demonstrated by the cost of the immense plants which are now so steadily going up in all parts of the world.

The mill proper was a frame building 38x90 feet, with a lean-to on one side 17x40 feet. The latter building was occupied by the water wheel, the steep room and the bleach room. The main building was two low stories in height, with an attic on either side, of which the rafters reached to the floor.

This was the only drying room which the mill possessed up to 1834. The lower floor was of ample size for the engines, the paper machine and a store room; the second story was used as a rag room, duster room and finishing room. The machinery and the methods employed in its use were far more remarkable than the buildings themselves.

There were three engines with a capacity of 175 pounds each, one of which was used for washing and the other two for beating.

The 42-inch paper machine would to-day be considered a great curiosity. It had only one making cylinder, and instead of the steam dryers now in use the paper ran over an immense sheet-iron dryer within which a wood fire was kept burning. Steam for the boiling was furnished by a small upright boiler. The mill was heated by box stoves burning wood, and in winter a fire was kept burning in the wheel room to prevent the freezing up of the wheel. This was a large, old-fashioned wooden overshot, revolving in a stone wheel pit, and the power was obtained from a raceway leading from the Farmington River. The lower story was very low in the joists, so low in fact that when later larger engines were put in the low ceilings would not admit of the raising of the cylinder washers, and holes had to be cut in the ceiling, so that when the cylinders were raised the rack projected up through the floor among the bales of stock. The Farmington River water was then remarkably pure and soft, and was perhaps the best natural water for paper making then known; and after running for a few months on rag news paper, Messrs. Platner & Porter wisely decided to commence the manufacture of fine papers. The result was gratifying in the extreme, and the 700 pounds' capacity of the old mill was soon found to be entirely inadequate to the demand.

However, they contented themselves with this output until the summer of 1854, when a new mill was built and started with a capacity of 1,800 finished pounds of paper a day.

The mill was fitted with the best equipment then known, including a Fourdrinier machine, then a great novelty, three 300-pound beaters and one 400-pound washer.

Laid note papers had just been introduced and these, folded, were made the special product of this machine, as the old cylinder machine could not make them.

In the five years that followed annual dividends of 116 per cent. were declared, the lowest yearly return being after the panic of 1857, when it was but 8 per cent. In 1856 the old mill, which had been lying idle for a year, was fitted up with a new 48-inch cylinder with steam dryers and run with the Fourdrinier on flat papers. There was then much experimenting in stock. A lot was procured, consisting of an invoice of old papers, at 10 cents per pound, four bales of hemp at 6½ cents per pound, and six bales of grass rope at 6¼ cents per pound. The hemp and rope were chopped up with hatchets and run into paper, but without brilliant success, the paper being used up some twenty years after for lining cases.

The methods employed in converting old papers into new were very crude. The stock, composed of ledgers and account books made of the best papers, was thrown into the boiling tub and stamped down by walking on it. Then a thick layer of soda ash, costing 6½ cents a pound (now three-quarters of a cent), was spread over the paper, and thus alternate layers of paper and crude soda ash until the kettle was fully charged.

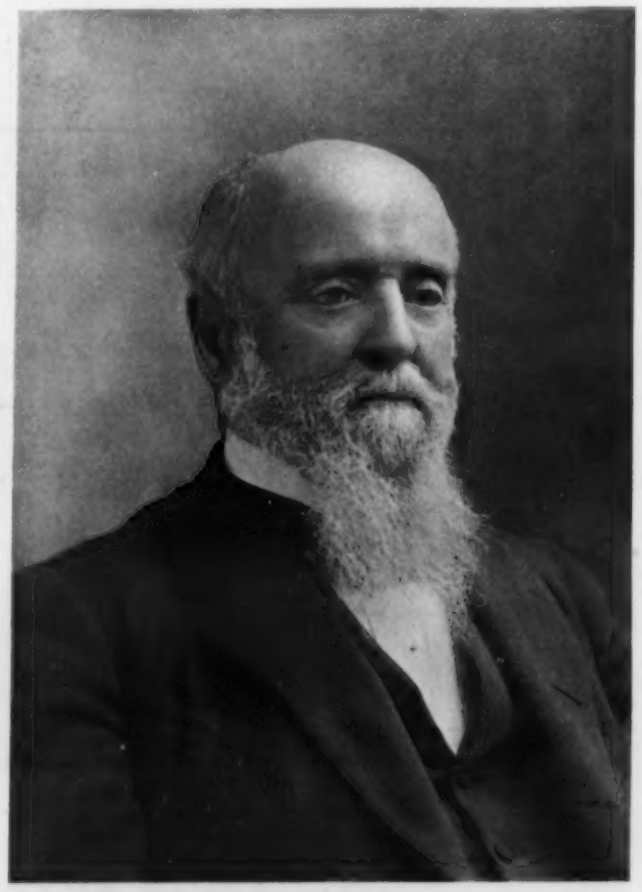
Then steam was let on, and the mass boiled for thirty-six hours.

The plug was then drawn and the soda ash liquor was wasted into the stream.

When thrown out of the kettle with forks, large masses of soda ash would be found almost dry, adhering to the stock. Messrs. Platner & Porter balanced their books in 1848, after eighteen months' business. They had expended $5,000 in fitting up for the manufacture of writing paper. After allowing each $500 for a salary, the inventory showed a profit of a little over $1,000. The first sales were only of folded ruled cap and letter, and most of the sales were of blue paper, then in almost universal use. Papers were then sold by name and ream, and not by the pound; they were thin and the finish was high, and the postage being by the piece, the sheets were large. Early machine books show that the machine was run sometimes a month at a time on seven-pound blue letter. In 1848 flat caps, mostly blue, were made, the first blue folio and medium following the ext year. Flat folios were invented and first manufactured by this firm in 1854. Up to this time the letter sheet was the smallest made, foolscap being the general favorite. In 1850 Bath post, a very small sheet, was first introduced and became very fashionable for about four years, until the advent of note-sized sheets. About this time the naming of special brands of paper first came into vogue, and usually the first took its name from the name of the mill that made it. The early papers were sent to market in small cases containing about forty reams of blue ruled cap (360 pounds). The case was made of unplaned pine boards, cut and sawed on the nearby mountain, without cleats, but the cases were hooped at each end with a bent sapling.

In 1847 a workman made 153 boxes at one shilling each (12½ cents). Hoops were shaved and kept pliable by being thrust under the drippings of the old wooden, open drainers. In 1849 the hoops cost 1½ cents each.

Writing papers were done up in two wrappers very like the miniature of a bundle of book paper to-day. The under wrapper was dark blue, being just large enough to fold up part way



SAMUEL Q. PORTER.

upon the edges of the ream, and the white top wrapper folded down similarly over the blue one. Each ream was tied neatly by strings, and the blue and white contrasted with a pleasing effect in the parti-colored package. The first wrappers were made from the coarser rags or from the reams, etc., rejected in fine writings, which were called "wrapper stock."

Filters were not used until 1865. Previous to this time so fine was the quality of the river water that flannel straining bags alone were used; when the water became roiled after a storm the mills were shut down. In 1847 the superintendent received $1.50 per day, a machine tender $1, while the back tender received only 60 cents. Cutter girls received 42 cents, 3 cents less than the rag sorters, while the washermen received the same wages as the men on the beaters. It was not until 1865 that a machine tender received $2 a day. The prices received for the paper are very near the price quoted to-day. From 1847 to 1865 first-class writings jumped from 22 cents per pound to 53 cents and all other papers in proportion.

The following extracts from the mill records, bearing upon the conditions of labor fifty years ago, may prove inter sting. There were two women in the rag room. Their wages were $2.12½ and they paid out $1.12½ for board. This was then the regular rate for board, and all board bills were paid at the office. Three scythes for the rag room cost $7.50. The first consignment of rags cost 4½ cents and was bought on six months' credit—the customary time in those days. The water rent was $100 a year for about 13 horse-power. Alum cost 3 cents a pound, ultramarine blue 85 cents a pound, and a wire covering for a cylinder cost $34. In 1847 a pair of shoes for Mr. Platner cost $1, brogans for the help 75 cents, while fifty buff envelopes were bought for 25 cents. In 1854 a 62-inch plain dandy roll cost $95, and the 62-inch Fourdrinier machine $5,345. For many years the majority of the help was recruited from the village and the farms nearby, and in the winter time the company's teams drove about, and collecting the workmen, took them to the mill.

The following comparison of prices and of wages with those of the present time shows more fully the difference between the beginning and the height of the paper-making industry. From 22 cents a pound in 1847, the price of first-class folded writings went up to 52½ cents per pound in 1865.

At the same time the cost of labor in each pound increased from 3¾ cents in 1855 to 7½ cents in 1875; the percentage of wages to total cost had greatly increased, being 13 per cent. in 1855, and 25 per cent. in 1875. It is surprising to notice that while the cost of labor in production had increased 8 per cent. from 1865 to 1880, the selling price of paper had declined 56 per cent. in the same time.

The price of superfine writing folded declined 58 per cent. from 1865 to 1880. The price of machine-finished book paper dropped 53 per cent. in 1865–80, and super-calendered book fell 50 per cent. in price during the same period. The increase of wages is marked. From 1847 to 1880 the increase is over 107 per cent.

This seems to be an answer to those who would try to prove that the condition of the working people is steadily growing worse.

With the following estimate, characteristic of the author, paper manufacturers can make some interesting comparisons:

William Platner's Estimate of the Cost of Running a Mill Making 1,800 Pounds of Writing Paper per Day, April 15, 1863.

For services of proprietors, all the hands, teaming, services at bleach house, blacksmithing, ordinary repairs per day, and ordinary labor per day		$88.00
10 per cent. on cost of two mills, office, etc.		14.00
Wrappers and labels		14 00
2,350 pounds of coal, at $7.70		8.08
5,000 pounds freight, less (1,800—600) 1,200 paper, $4 per ton, 3,800 pounds		7.60
250 pounds sizing, at 12 cents		30.00
41 pounds bleaching powder, at 4½ cents		1.84
28 pounds alum, at 4¼ cents		1.92
2¼ pounds ultramarine, at 75 cents		1.69
12 pounds A. C. lime, at 8 and 3-10 per cent.		.99
Felting, all kinds, and jackets		2.00
3 pints kerosene oil, 20 cents; 1 quart machine oil, 42 cents		.62
Lamp oil		.13
125 feet boards, for boxes, at $17		2.13
5 pounds nails, for boxes and repairs		.20
Wire cloth (one in 66 days), at $86.39		1.31
Deckle straps		.08
Apron leather, 3 cents; lace leather, 2 cents		.05
Soft soap and hard		.09
Ruling pens, ink, gall, etc.		.04
Sealing wax, 33 cents; twine, 10 cents		.43
Belt hooks, 2 cents; brooms, 5 cents; babbitt, 1 cent		.08
Die metal, 1 cent; scythes, 4 cents; files, 1 cent		.06
2¾ pounds box lining paper, at 12½ cents		.34
3½ pounds hardware, at 10 cents		.35
1 cask lime		1.50
Screws, 1 cent; tissue paper, 2 cents; scythe stones, 1 cent		.04
Wires, 2 cents; turpentine, 4 cents; hogsheads, 2 cents		.08
Insurance, postage, envelopes, coal for office, expense, New York, Boston, Hartford, etc., taxes, slip rent for girls, etc.		97.75
Water rent		2.96
Interest		17.00
Say 2,400 pounds rags, at 14 cents	$336.00	
Less 125 pounds coarse stock, which is 21 pounds silks and wools, at 2 cents	$0.42	
104 pounds stock, at 4½ cents	4.68	
200 pounds shavings, at 14 cents	28.00	
	33.10	302.90
Total		$620.20

This makes the average cost on 1,800 pounds of paper 29½ cents per pound at the mill, and at that time the best papers were selling for 40 to 50 cents a pound. Paper makers must look back on the old days with real regret. Then it was that small capital brought great returns; now great capital is necessary before even a beginning is made, and the profit grows continually less in proportion to the amount employed.

In 1864 Mr. Platner sold out his interest in the mill to H. C. & M. Hulbert, of New York. He was a man of great integrity, with a force of character much above the average. Clear-headed and accurate, he followed closely every detail of the manufacture. He gave every part of the mill his personal attention, and worked as hard as any man in his employ. He died in Newark, N. J., in 1883, and was buried in Unionville.

From 1864 until his retirement from business life in 1878 Samuel Quincy Porter was the head of the business. It was during this period that the wonderful flood tide of prosperity following the civil war saw its beginning, its height and subsidence.

His especial care was the placing of the product, and apart from the excellence of the goods his great success was due in no small degree to his attractive personality and genial manner, which won him the lifelong friendship of those with whom he came in contact.

He has always been closely identified with the social, political and religious matters of the town.

A member of the Connecticut General Assembly during several sessions, he was State bank commissioner for a period of four years, and in 1860 he was a member of the committee that nominated Abraham Lincoln for the presidency. He has always been a very public-spirited man, foremost in every movement toward the beautifying of the town and the development of its resources, and to the present time has held the love and respect of the people among whom he has lived and labored for so many years.

The imports of rags to the United States during the years 1871 and 1872, according to figures given in the first edition of Lockwood's Directory, were as follows: 1871—From British ports, 52,107 bales: from Italian ports, 23,744 bales; from the Levant, 5,532 bales, and from Northern Europe, 13,892 bales. 1872—From British ports, 45,750 bales; from Italian ports, 23,134 bales; from the Levant, 11,149 bales; from Northern Europe, 15,001 bales, and from the East Indies, 4,602 bales. These figures did not include the importation of the whole country, but were presented to show the correct proportion of rags received from the countries named.

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BLOTTING PAPER.

ITS MANUFACTURE BEGUN HERE IN 1856.

The Opening of a Case of English Blotting Paper and Its Results—A Test Which Ended Satisfactorily to the American Product—The Number of Manufacturers Increased Considerably During the Last Ten or Fifteen Years.

By W. H. EATON.

THE editor has asked me to say something of interest to THE JOURNAL readers about the blotting-paper trade, the particular branch of the paper industry to which I belong, in honor of the quarter-century celebration of the establishment of THE PAPER TRADE JOURNAL. For want of time this article must be brief, and very likely its brevity may prove its chief attraction.

Blotting paper, like all other articles in common use, had its beginning in a small way, and was not manufactured in this country until long after other papers had been made here successfully. The writer remembers well the familiar sand box of thirty-five or forty years ago, and how the writer would take up a freshly written page in one hand, while with the other he would "pepper it" with sand, much after the fashion of using the pepper box at table, and then stand a little while swaying it back and forth through the air to dry it, then shaking off the surplus sand, so far as possible, back into the box to save it; the missive was enclosed in the hand-made envelope or folded and

W. H. EATON.

sealed and addressed, and I have often seen the sand fall out of the letter when opened by the person receiving it. But all this has long since passed away, thanks to the inventor of blotting paper. The old sand box of our fathers' and grandfathers' days has been relegated to the rubbish heap or kept as a relic of "ye olden times," and tons of blotting paper daily absorb the gallons of surplus ink. The use of blotting paper has constantly increased from its first introduction, till now it has come to be regarded as critically and tested as thoroughly as any other kind of paper made, excepting possibly bond and ledgers. The United States and other Governments name it in their schedules for supplies, and no railroad company, insurance company, or any other large bank or manufacturing establishment considers its stationery department complete without its quota of blotting pads.

My first introduction to the blotting-paper business was with the well-known firm of Joseph Parker & Son, of New Haven, in September, 1877, more than twenty years since. Any reference to the history of blotting paper would be incomplete without mentioning this old-established and honored firm, the pioneers in the business. The senior, Joseph Parker, was the first to make blotting paper in this country, and he lived to see the foreign paper driven almost completely from the American market, owing to the excellence of his manufacture, and for years his firm and its successors manufactured exclusively blotting paper which was the acknowledged standard for quality.

In 1856 Mr. Parker was making a visit to the store of Henry Bainbridge & Co., wholesale stationers, now at 99 William street, New York. While he was there a case containing English blotting paper was opened. Mr. Parker examined the blotting, and producing some sample sheets of a special board made at his mill, he asked that a comparison be made between his board and the blotting paper, and when the test was made his board proved to be the better absorbent.

His board was made of cotton waste. Mr. Parker then began to manufacture blotting, and he was the first American manufacturer of that article. At first the demand was small and even up to the sixties the call for it was not of much importance.

Within the past ten or fifteen years others have come into the field with aspirations for equality or supremacy, some being successful, others less so, but all striving for the best place. And while the mills making blotting paper have greatly multiplied and the uses for blotting are somewhat restricted as compared with other papers, say book, news and fine papers, yet the quality of the best mills has constantly improved, while prices have as constantly declined. I have no accurate data to guide me in making statements in regard to the use of blotting, yet I think it within the bounds of truth to say there may be ten times as much blotting used in this country to-day as there was twenty years ago; and, notwithstanding the extensive use of the typewriter, which no doubt to some extent has restricted its consumption, I am inclined to think that blotting paper as a commodity is holding its own. Most of the blotting paper made in this country is disposed of in the domestic market, though quite a considerable quantity in the aggregate finds its way into foreign countries, and in increasing quantities. I think it safe to say that for general excellence the standard brands of this country equal, if they do not excel, those made in any other country. For the past few years, in common with nearly all lines of manufactures, blotting manufacturers have suffered from the generally constricted condition of business, but have probably fared as well as the average, and all look forward to a better state of things in the future.

I beg to offer my congratulations to THE JOURNAL on its silver anniversary and on its present efficient management, and sincerely hope its next twenty-five years may prove increasingly useful and successful.

Old-time Scarcity of Paper and Rags.

In these modern days, when paper is so plentiful and so cheap, it seems rather curious to look over the old records and find that not only was paper then scarce, but that the rags from which it was made were only secured after the most insistent and touching appeals, many of the latter appearing in the form of verse.

In 1732, Richard Fry, stationer, bookseller, paper maker and rag merchant, of Boston, returned thanks to the people for giving heed to his advertisement, published some time before, asking them to save their rags.

In 1769 the Boston *News Letter* announced that "the bell-cart will go through Boston before the end of next month, to collect rags for the paper mill at Milton."

In 1776 the Massachusetts House of Representatives, in view of the scarcity of paper, resolved that the committees of correspondence and inspection and safety in the several towns be required to appoint persons to receive rags for the paper mills, while the people were warned to save their rags.

Soldiers were frequently excused from duty in order that they might work in the paper mills, and in the *Historical Magazine*, Volume VIII., it is stated that when the American army entered Philadelphia in 1778 upon the evacuation of the British troops there was a want of paper suitable for the making of cartridges. An advertisement brought forth only a small quantity of the article needed. An order was then promulgated demanding the instant production of such paper by all persons who possessed it, but the results were meagre, as not many people had it, and those who had held it in small quantities only. The soldiers were then ordered to search the houses. Among the places visited was a garret in a house where Benjamin Franklin previously had had his printing office. There the military discovered about 2,500 copies of a sermon by Rev. Gilbert Tennant on "Defensive War," and which had been printed by Franklin. These were taken, and were used to make cases for cartridges, which were used at the Battle of Monmouth.

ELECTRICAL POWER.

ITS USE IN THE OPERATING OF PAPER MACHINES.

The Only Mill Using It at Present—The Necessity for Reducing Cost of Production—Brief Description of the Electrical Plant—Satisfactory Results Obtained from the Use of Electric Power—The Economy.

By Hon. ARTHUR C. HASTINGS.

AS representing the only mill (at least in the United States) using electricity for power in the manufacture of paper, I have been requested by the editor of THE JOURNAL to contribute a brief, practical statement of our experience with this mode of transmission, without touching upon the technicalities of the art.

It is said "the consumption of paper is the measure of a people's culture." This being so, the growth of the manufacture of this article would indicate that we, as a people, are highly cultured.

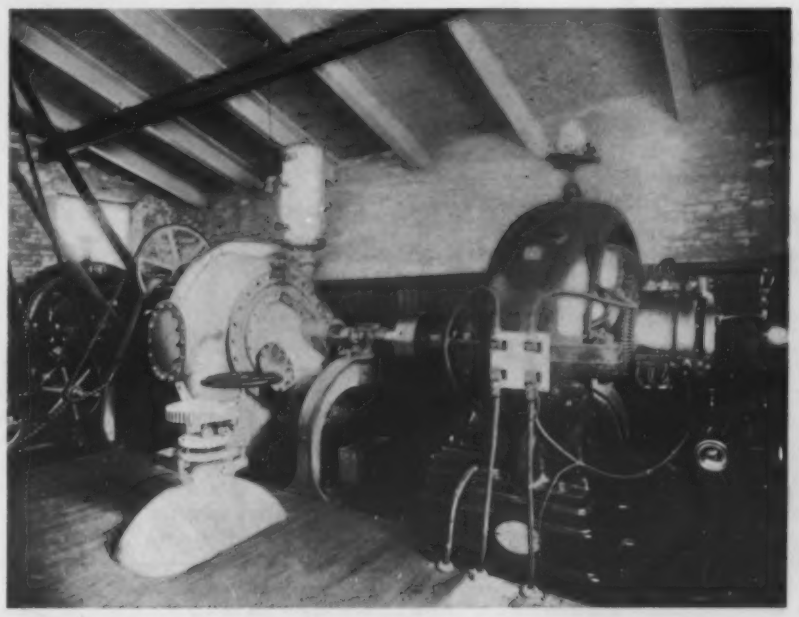
In 1895 there were in operation some 1,200 mills making all grades of paper, from coarse strawboard to fine writing, with a total daily product of 7,000 tons. Of this quantity, 348 mills made 3,250 tons per day of paper used for printing or writing purposes, the increase in ten years being over 50 per cent. This increase has meant competition, lower prices and inventions to cheapen the production. Aside from improved machinery, the greatest reduction in cost has been the use of wood pulp.

Now that all mills are about on an even basis as to the cost of

HON. ARTHUR C. HASTINGS.

the raw material and improved paper-making machinery, the successful paper manufacturer begins to look into the detail of the business with a view of cheapening the production in smaller ways. The company of which the writer is manager, about a year ago, having a surplus of water that could be used, and advantageously situated for development, put in an electric-power plant of 300 horse-power, the two generators of 150 horse-power each, direct connected to the water wheel, thereby saving any belts or slippage, running under 500 volts and carrying the current about 400 feet to the paper mill above the cliff where it is used, through two motors of 125 horse-power each, to drive Fourdrinier machines, also small motors in different parts of the mill, wherever it is necessary to have power at a point where it would be inconvenient or expensive to run belts or shafting.

Our experience with this power has been even more satisfactory than we had hoped for. We are getting very steady speed on the paper machines, the motors never checking, and the cost of attendance being



GENERATOR ROOM.

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nominal. While the generators and motors are some 400 feet apart, the only means of connection between them being an incline elevator, one man attends to both generators and motors and does whatever is necessary in the way of wiring or attending to our lighting circuits. The cost of oil for lubrication is not one-twentieth of what it was with steam engines, and the saving of coal is at least 50 per cent.

The governing of the water wheel, of course, has a great deal to do with the steadiness with which the motors are run, although a variation of 5 per cent. of the speed of the water wheel does not give over 2½ per cent. variation on the motor, through the compound winding.

I believe it would be economy for any new mill to equip itself with a central station for the development of its power electrically, and distribute it through the whole plant by motors, thereby saving putting in shafting and belts, and ofttimes losing power through running a great deal of useless shafting, besides saving in other ways, such as oil, fuel and attendance.

Another point of great importance to any user of power is the ability to tell where he is using the greatest amount of power in his mill. For instance, a Fourdrinier paper machine will take a certain amount of power when running at a certain speed; the power is increased quite materially as the speed of the machine is increased. The line shafting takes so much, the presses, wire, etc. With steam engines or water wheels it is practically impossible to get at the exact amount of power taken at each point, but with the instruments used with electric power, one can determine just where he is using power and where it can be saved. In our own case we have been able to regulate the power to the exact amount required to run a certain size machine, as we have found shafting out of line, tight bearings, etc., by experimenting, that is, running different parts of the machine separately, at different times.

The use of electric power is no experiment, as shown by the development and use at present of about 25,000 horse-power by two power companies in Niagara Falls. Both companies are enlarging their plants and will have a total capacity of 150,000 horse-power. The electric current is delivered and used at a distance of twenty miles, successfully, which shows the possibilities at the present time. What the possibilities of the future are cannot be foretold.

Two Early Connecticut Mills.

Nearly all writers agree that Ebenezer Watson and Austin Ledyard, who were associated together under the style of Watson & Ledyard, built the second mill in Connecticut. The senior member of this firm was the owner of a portion of land and a water privilege, and in order to keep them out of the hands of his creditors he transferred them to his partner, Ledyard. The mill was erected in 1775 on the Hockanum River, at North Manchester, which at that time was a part of East Hartford.

Thomas Green, the publisher of the *Connecticut Courant*, had been a partner of Watson's in former years, and two years before the latter began to construct his mill, the sole purpose of which was to supply paper for the *Courant*, the size of that journal was changed from "pot" to "crown." The news of the battle of Lexington was printed in the *Courant* on paper made at Watson & Ledyard's mill.

In 1778 the mill was destroyed by fire, and Watson having died, his administrators asked the General Assembly to appoint a committee to adjust their accounts, and for liberty to grant a deed of one-half the residuary estate to Watson's heirs. The committee was appointed and reported that upon the termination of the partnership, January 30, 1779, there was due to Ledgard the sum of £17 17s. 3½d., and that a settlement deed of release of one-half of the gross amount should be made to the Watson side.

In 1784 Butler & Hudson built a mill at East Hartford, only a short distance from the site of the Watson & Ledyard mill.

The foreman of the establishment was Timothy Keeney. Shortly after the mill was completed Hudson retired, and John Butler became the sole owner. When he died the property was purchased by Increase Clapp, Timothy Keeney, James B. Wood and Sanford Buckland, who associated themselves together under the firm style of Clapp, Keeney & Co. The legend is that they were the first to use bookbinders' shavings to mix with raw material in making paper. They obtained these shavings from New York binderies, and by their use reaped a large profit.

RAGS! RAGS! RAGS!

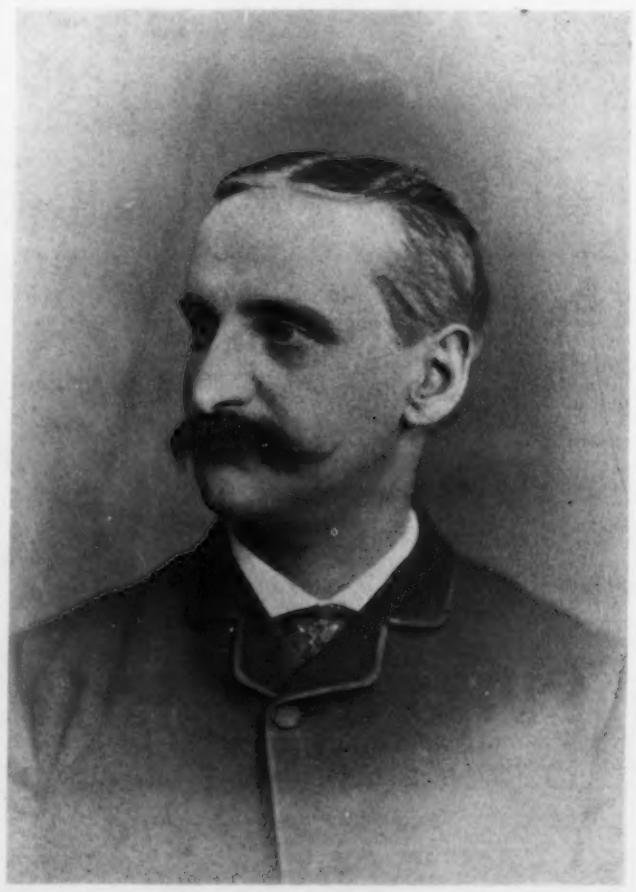
REMINISCENCES OF THE GOOD OLD DAYS OF HIGH PRICES.

The Buying and Selling of Rags Twenty-five Years Ago—The Old-Time Leaders in the Importing and Domestic Rag Business—Prices Then and Now—In the Domestic Business the Irishman Has Been Succeeded by the Italian.

By HENRY ATTERBURY.

I CONGRATULATE THE PAPER TRADE JOURNAL upon its twenty-fifth anniversary. May its fiftieth occur under as pleasant auspices!

How well I remember the first number of THE PAPER TRADE JOURNAL and the opposition it encountered, very many members of the trade complaining that their customers already knew more than was good for them. What happy remembrances of good times also



HENRY ATTERBURY.

cluster 'round the recollection! How our mouths water over white rags at 7 cents, thirds and blues at 4¼ cents, white shavings at 5½ cents, and Fabricotti linens at 8¾ cents. These were not fancy or "boom" figures, but regular staple prices. The war had ceased years before, and prices had settled to what we all considered standard, from which the variation one way or the other would thereafter be small. Think of selling old newspapers, which now go begging at less than half a cent per pound, at 3½ cents, and easily at that! When the historian of our trade writes his letter on your fiftieth anniversary may he, with pleasanter feelings, be able to say: "Think of selling newspapers, which now go so readily at 3½ cents, for 45 cents per 100 pounds!"

When THE JOURNAL first saw the light, Marples & Shaw (represented then by the genial Jeremiah Sturges), Wood & Weed (from whom came Stephen Lee), White, Sheffield & Co., H. C. & M. Hulbert, Sergeant & Hunt, Briggs & Taylor, W. H. Parsons & Co., and J. W. Mason & Co. were among the large importers; and the large domestic packers were E. W. Taylor & Co., Owen Keenan, Taylor & Darrow, George Harley, Pat Gildea, Dan Sweeney, and Charley Maginnis, the last named being long known as the "honest man" of the business. He has been dead several years. Many of those mentioned have passed from the vexations and trials of the business, while others (or their successors) are yet struggling with claims for short weight, inferior quality, etc.

A comparison of the prices at that time and the present values may be of interest to some of THE JOURNAL readers, and I therefore make the following extracts from our books, the prices given being those at which actual sales were made by us, while those given as present value are those at which we would *like* to sell to-day, viz.:

P. P. Leghorn Linens, per pound	at 8¾c.	Present value	4⅛c.
Egyptian Blues "	" 4¼c.	" "	1c.
S. P. F. German Linens "	" 6¼c.	" "	2¼c.
German Blue Linens "	" 6½c.	" "	2¼c.
German Blue Cottons "	" 4¾c.	" "	1¼c.
English Checks and Blues, per pound	" 5c.	" "	1¼c.
English Dirty Fines, per pound	" 6¼c.	" "	1¾c.
Domestic No. 1 Soft White Shavings, per pound	" 5½c.	" "	1½c.
Domestic Book Stock, per pound	" 4c.	" "	¾c.
Domestic Old Newspapers, per pound	" 3½c.	Per cwt.	45c.
Domestic Commons and Chips, per pound	" 1½c.	Per cwt.	30c.
Domestic White Rags, per pound	" 7c.	Per pound.	3c.
Domestic Thirds and Blues, per pound	" 4¾c.	" "	1¼c.

During the past twenty-five years there have been many changes in business methods in our line. Everything was sold twenty-five years ago much nearer a cash basis, sixty days being considered a very long time. Many of the mills purchased their supplies through the paper warehouses, profits being sufficient to allow a division. The domestic dealer purchased his rags from the tin peddler, whose peculiar wagon could be seen on almost every country road throughout the land, or from the Irish hand cart pusher with his string of bells. Perhaps you have not noticed it, but who sees any of them now? The few that are left are fast passing away, and the ubiquitous Italian is taking his place. Perhaps before many years the profits will have dwindled so that even he will be replaced by the Chinaman or some other heathen.

There have been few changes as to the countries and sections from which we receive rags, but some places that formerly were large factors in the supply are not heard of now. Russian linens have about vanished. Catania and Trieste, Salonica and Constantinople furnish nothing, although formerly they sent us many thousand tons.

A few days ago the writer came across an old memorandum book containing minutes of his first trip among the mill. There being no "directory" at that time, he was forced to secure his information as to the names, size, location of mills, quality of paper made, etc., from whatever source he could, while now all one has to do is to turn to the pages of Lockwood's Directory, and get there all and more information than one can possibly require. That memorandum reading, "Albion Paper Company, one 62-inch machine, making two tons collar paper per day; Glens Falls Paper Company, one 72-inch Harper machine, straw news; Allen Brothers, 13 tons per week hanging papers," which seems very ancient history when on turning to the latest number of the directory one finds the same parties making 40,000 pounds, 500,000 pounds, 80,000 pounds per day respectively. They were all very good to us and showed their appreciation of our visit by placing orders, although we are afraid that some of them would have an apoplectic stroke if asked to give orders for the same grades to-day. Trade secrets are sacred, even after twenty-five years, but think of making hanging paper from F. G. linens.

Accept my best wishes for the prosperity of THE JOURNAL. May THE JOURNAL not only for the next quarter, but for the full century, enjoy a continuance of that prosperity and success which it so richly deserves.

In 1810 Thomas estimated that there were 185 mills in the United States, of which seven were in New Hampshire, thirty-eight in Massachusetts, four in Rhode Island, seventeen in Connecticut, nine in Vermont, twelve in New York, four in Delaware, three in Maryland, four in Virginia, one in South Carolina, six in Kentucky, four in Tennessee, and sixty in Pennsylvania. He estimated that they had a production of about 240,000 reams.

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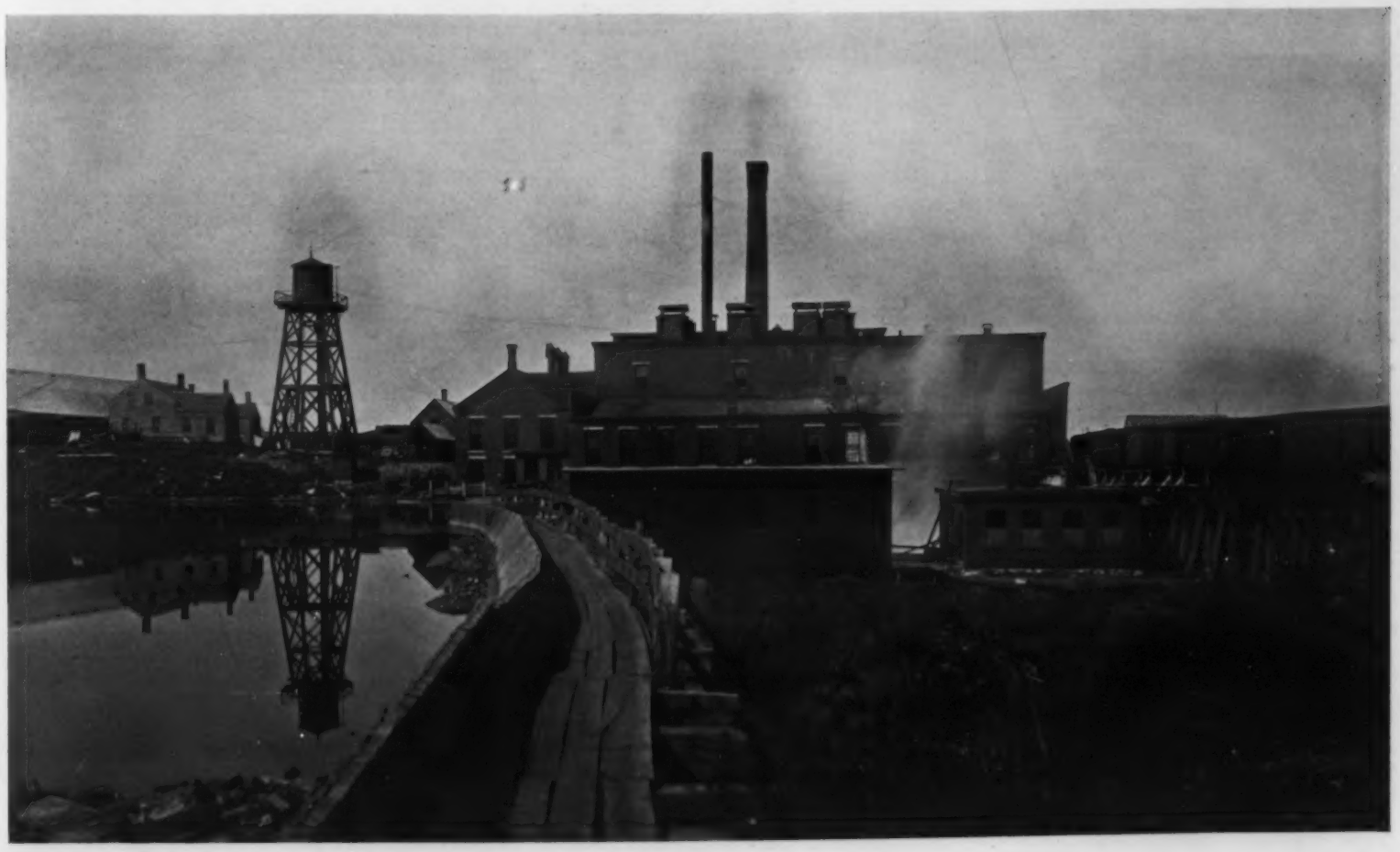

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			Daily Capacity in Gallons.
Bangor Water Works	Bangor, Me		5,000,000
Knoxville Water Co.	Knoxville, Tenn	3,500,000	
Knoxville Water Co. (2d order)	Knoxville, Tenn.	1,500,000	5,000,000
Biddeford and Saco Water Co.	Biddeford, Me		3,000,000
Decatur Water Works	Decatur, Ill		3,000,000
Oshkosh Water Works Co.	Oshkosh, Wis	2,000,000	
Oshkosh Water Works Co. (2d order)	Oshkosh, Wis	400,000	2,400,000
Maine Water Co.	Brunswick, Me	600,000	
Maine Water Co. (2d order)	Calais, Me	1,500,000	2,100,000
Warren Water Co.	Warren, Ohio		1,500,000
Athens Water Works	Athens, Ga		1,000,000
Winfield Water Co.	Winfield, Kan		1,000,000
Reading Water Works	Reading, Mass		1,000,000
Durham Water Co.	Durham, N. C		900,000
Berwyn Water Co.	Pickering Creek, Pa		750,000
Augusta Water Co.	Augusta, Me		600,000
Macon Gas Light and Water Co.	Macon, Ga		500,000
Winston Water Works	Winston, N. C		500,000
Keyport Water Works	Keyport, N. J		500,000
Goldsboro Water Works	Goldsboro, N. C		500,000
Rumford Falls Electric Light & Power Co.	Rumford Falls, Me		500,000
Gettysburg Water Co.	Gettysburg, Pa		300,000
North Berwick Water Co.	North Berwick, Me		300,000
Bryn Mawr Water Co.	Overbrook, Pa		250,000
West Reading Water Co.	Reading, Pa		250,000

PULP AND PAPER MILLS.

S. D. Warren & Co.	Cumberland Mills, Me		12,000,000
Otis Falls Pulp Co.	Livermore Falls, Me	1,000,000	
Otis Falls Pulp Co. (2d order)	Livermore Falls, Me	750,000	
Otis Falls Pulp Co. (3d order)	Livermore Falls, Me	1,500,000	
Otis Falls Pulp Co. (4th order)	Livermore Falls, Me	3,000,000	
Otis Falls Pulp Co. (5th order)	Peterson Rips, Me.	3,000,000	9,250,000
New York & Penna. Co.	Johnsonburg, Pa.	4,000,000	
New York & Penna. Co. (2d order)	Lockhaven, Pa.	2,500,000	
New York & Penna. Co. (3d order)	Johnsonburg, Pa.	1,500,000	
New York & Penna. Co. (4th order)	Johnsonburg, Pa.	1,500,000	9,500,000
Tileston & Hollingsworth Co.	Milton, Mass.	2,000,000	
Tileston & Hollingsworth Co. (2d order)	Hyde Park, Mass.	6,000,000	8,000,000
Piedmont Pulp and Paper Co.	Piedmont, W. Va.		6,000,000
Hollingsworth & Whitney Co.	Gardiner, Me.	2,000,000	
Hollingsworth & Whitney Co. (2d order)	Waterville, Me.	3,000,000	
Hollingsworth & Whitney Co. (3d order)	Waterville, Me	375,000	5,375,000
Shattuck & Babcock Co.	De Pere, Wis.	2,250,000	
Shattuck & Babcock Co. (2d order)	De Pere, Wis.	2,250,000	4,500,000
Fox River Paper Co.	Appleton, Wis.	1,250,000	
Fox River Paper Co. (2d order)	Appleton, Wis.	750,000	
Fox River Paper Co. (3d order)	Appleton, Wis.	1,500,000	3,500,000
M. & W. H. Nixon Paper Co.	Manayunk, Pa.	750,000	
M. & W. H. Nixon Paper Co. (2d order)	Manayunk, Pa.	2,500,000	3,250,000
Penobscot Chemical Fibre Co.	Great Works, Me.	2,000,000	
Penobscot Chemical Fibre Co. (2d order)	Great Works, Me	1,125,000	3,125,000
Glen Manufacturing Co.	Berlin Falls, N. H.		3,000,000
Rumford Falls Paper Co.	Rumford Falls, Me.		3,000,000
Nekoosa Paper Co.	Nekoosa, Wis.		3,000,000
Howland Falls Pulp Co.	Howland, Me.		3,000,000
P. H. Glatfelter (Spring Grove Paper Mills).	Spring Forge, Pa.	3,000,000	
P. H. Glatfelter (Spring Grove Paper Mills).	" " (2d order)	1,000,000	4,000,000
Forest Paper Co.	Yarmouthville, Me.	1,500,000	
Forest Paper Co. (2d order)	Yarmouthville, Me.	1,500,000	3,000,000
Eastern Manufacturing Co.	Brewer, Me.	600,000	
Eastern Manufacturing Co. (2d order)	Brewer, Me.	2,250,000	2,850,000
Keith Paper Co.	Turners Falls, Mass.		2,750,000
Korn & Bock	Breslau, Germany	1,500,000	
Korn & Bock (2d order)	Breslau, Germany	1,125,000	2,625,000
Orrs & Co.	Troy, N. Y.	1,500,000	
Orrs & Co. (2d order)	Troy, N. Y.	1,000,000	2,500,000
Rumford Falls Sulphite Co.	Rumford Falls, Me.		2,250,000
Katahdin Pulp and Paper Co.	Lincoln, Me.		2,250,000
Centralia P. and W. P. Co.	Centralia, Wis.		2,000,000
West Virginia Pulp Co.	Davis, W. Va.	1,000,000	
West Virginia Pulp Co. (2d order)	Davis, W. Va.	750,000	1,750,000
Crocker, Burbank & Co.	Fitchburg, Mass.	1,700,000	
Crocker, Burbank & Co. (2d order)	Fitchburg, Mass.	700,000	2,400,000
Dill & Collins (Delaware Paper Mills)	Philadelphia, Pa.		1,700,000
Berlin Falls Fibre Co.	Berlin Falls, N. H.		1,600,000
Groveton Mills	Groveton, N. H.		1,500,000
Norman Paper Co.	Holyoke, Mass.		1,500,000
Turners Falls Paper Co.	Turners Falls, Mass.	1,125,000	
Turners Falls Paper Co. (2d order)	Turners Falls, Mass.	375,000	1,500,000
Hollingsworth & Vose Co.	East Walpole, Mass.		1,500,000
Orono Pulp and Paper Co.	Bangor, Me.	1,000,000	
Orono Pulp and Paper Co. (2d order)	Bangor, Me.	500,000	1,500,000
Silkeborg Paper Co.	Silkeborg, Denmark		1,125,000
Shawmut Fibre Co.	Shawmut, Me.		1,000,000
S. D. Warren & Co.	Gardiner, Me.		1,000,000
Cushnoc Fibre Co.	Augusta, Me.		1,000,000
Amoskeag Paper Mills Co.	Manchester, N. H.		1,000,000
Jackson Pulp Co.	Jackson, Mich.		1,000,000
Marinette and Menominee Paper Co.	Marinette, Wis.		1,000,000
Sheffield Paper Co.	Saugerties, N. Y.		1,000,000
Spaulding & Shepley	Sheldon Springs, Vt.		1,000,000
Haverhill Paper Co.	Haverhill, Mass.		800,000
F. W. Bird & Son	East Walpole, Mass.		800,000
Poland Paper Co.	Mechanics Falls, Me.		750,000
Oakland Paper Co.	Manchester, Conn.		700,000
Megargee Paper Mills.	Modena, Pa.		700,000
Contoocook Valley Paper Co.	West Henniker, N. H.		450,000
Caldwell & Co.	Inverkeithing, Scotland		300,000
Wm. H. Vinton & Son	Brattleboro, Vt.		250,000
Moore & Thompson Paper Co.	Bellows Falls, Vt.		50,000

MISCELLANEOUS.

Cheney Bros.	S. Manchester, Conn.	500,000
Jos. Bancroft & Sons Co.	Wilmington, Del.	500,000
Russia Cement Co.	Gloucester, Mass.	375,000
Everett Mills	Lawrence, Mass.	360,000
Odell Manufacturing Co.	Concord, N. H.	300,000
Mather & Platt.	Manchester, England	250,000
Whittier Cotton Mills	Lowell, Mass.	200,000
Estate George Olney	Cherry Valley, Mass.	200,000
Pope Manufacturing Co.	Hartford, Conn.	200,000
J. & P. Coats, Ltd.	Pawtucket, R. I.	200,000
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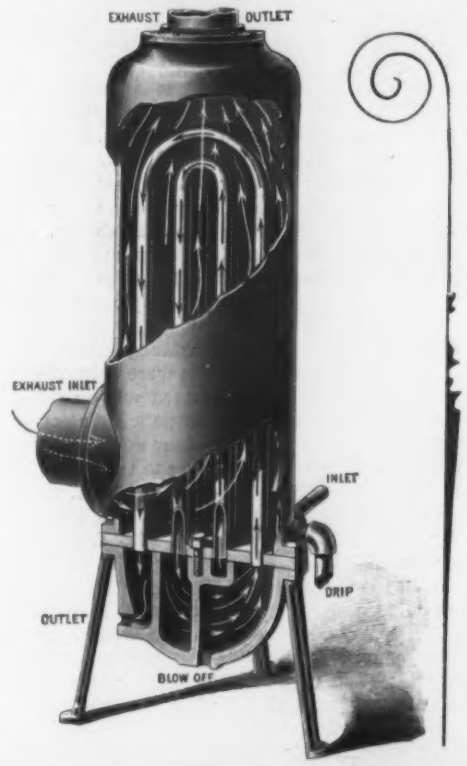

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Is presented to the trade and consumer with a few explanatory remarks, so there can be no misunderstanding as to its merits, both as a heater and purifier. We have attained results by our method of conducting water through tubes that equal, if not exceed, the best heater in the market, and at one-half the cost to purchaser.

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3d—Tubes being of brass, no scale collects.

4th—The ***SHELL*** and ***BOTTOM*** are made of heavy cast iron and this fact alone recommends it, as the corrosion of wrought iron is rapid, and as the heater shell receives the first deposits of alkali and other corrosive matter, cast iron is less susceptible to these corroding elements.

5th—In ***CONSTRUCTION*** we have aimed for simplicity, durability and cheapness, but have not lessened our ***area of heating*** surface. It will be noted in our patent base that the ***water*** has a positive ***circulation*** and by our method of dividing the water in small particles we bring less bulk of cold water at one time in contact with the exhaust steam, and thus save condensation; the water being practically spread out in a thin sheet passing over the heated surface of tubes, it attains a very high temperature quickly.

6th—Have arranged mud drum or (base of heaters), so no dirt or sediment can lodge in corners or sides, as in the case of many square base feed-water heaters, and consequently the settlings flow directly to opening of blow-off.

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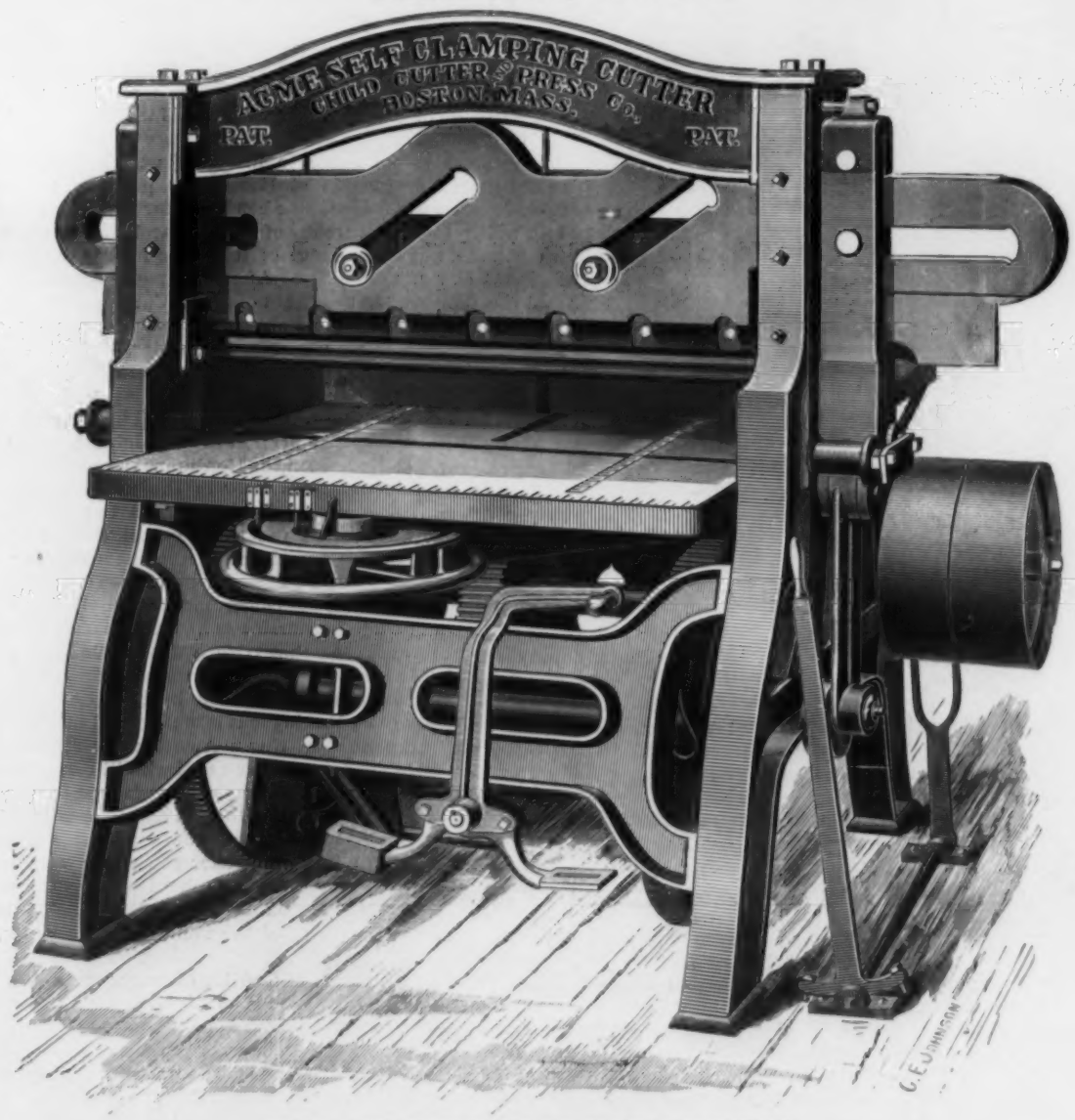

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1872 **THE PAPER TRADE JOURNAL** 1897

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THE HOWARD LOCKWOOD PUBLISHING CO.,
143 BLEECKER STREET, NEW YORK, U. S. A.

THE IVY MILLS.

THE HISTORY OF THE WILLCOX PAPER MILL FROM 1729 TO 1866.

The Establishment of the Plant—An Inventory of Its Equipment—The Various Owners of the Mill—The Extent of its Business in the Making of Bank-Note Paper—The Watermarks—Employees of the Mill.

By JOSEPH WILLCOX.

EARLY in the last century Thomas Willcox was attracted to Concord, Chester County, Pa., which was then covered almost wholly with primeval forests. Delaware County, in which Concord is now located, was formed in 1789. His former home, in England, is believed to have been near Exeter, in Devonshire. In the church records at Poltimore, two miles from Exeter, the name is frequently mentioned as early as 1712, sometimes spelled Willcox and at other times Wilcocks. It is not known when Thomas Willcox first settled in Concord, but his name appeared among the list of taxables there in 1725.

In 1726 he and a man named Thomas Brown built a mill dam on the west branch of Chester Creek, in Concord, and afterward leased the land on which the dam was located. On August 4, 1729, Thomas Willcox, having erected a paper mill on his property, took Thomas Brown into partnership in the business of making and selling paper. In this agreement, which is still preserved, it was provided that Thomas Willcox, in consideration of his teaching the said Thomas Brown the art of paper making, was to receive three-fifths of the profits, and Thomas Brown two-fifths. It is thus apparent that Thomas Willcox had learned the art of making paper before he came to America. In compliance with this agreement Thomas Willcox conveyed to Thomas Brown a half interest in the mill and two pieces of adjacent land, the sum paid by Thomas Brown for the half interest being £150. On May 6, 1732, Thomas Brown leased to Thomas Willcox his half interest in the mill and land, including the personal property in the mill, for the term of seven years at the yearly rental of £13. The following is a copy of the list of the personal property included in the above-mentioned lease:

An indentured Schedule of the Vessels Tools and Implements by the annexed Indenture Demised—That is to say.

A mortice and * * * mmers, a Vatt and Pott, two Stuff Tubbs, a Rag knife and Block, one press paper mould and a pair of Shop paper moulds, twenty-six fulling paper felts, Seventy-seven shop paper felts, two press paper Planks and a halfting plank, two Shop paper Planks, A Press and Rag wheel, a screw and Box, A Glazeing Engine, two pairing knives, two little pails with iron hoops, one Smal ads, two pairing frames—one pairing Bench, three cocks, two troughs, one winch, a halfting bench, two tressels, a Iron Barr, six post and Eighteen Rails for hanging of paper, one hundred polls for hanging paper, one pad, one pair of Stilliards, a Box for Paper Hanging stool, one hundred and sixty Tap pots, twenty cogs and three washers.

On January 23, 1739, Thomas Brown reconveyed to Thomas Willcox his half interest in all the above-mentioned real estate. This and all other land which Thomas Willcox afterward bought in Concord has been and is still owned by one of his descendants.

Very little is known about the operations in the mill from its first establishment until 1775, when the first paper for the continental bills was made, excepting that Thomas Willcox made some of the paper that Benjamin Franklin used, and that he made some of the paper for the colonial bills. This is known from the statements which his son, Mark Willcox, has made, as no books of that early period have been preserved. It is believed that the first orders for the paper for the colonial and continental currency were received through the influence of Benjamin Franklin, a friend of Thomas Willcox, and a frequent visitor at his house. In connection with this subject the following has been extracted from a letter which was written by James M. Willcox, the grandson of Thomas Willcox, and the father of the writer, addressed to Hon. Thomas Ewbank, commissioner of patents, and published in the United States Patent Report for the year 1850. The letter was written at the request of Mr. Ewbank.

About the year 1725 my grandfather, who was brought up to the paper business in England, came over and settled where I now reside. I have documents to prove that, in 1732, he had erected a mill, and was manufacturing paper. The kind of paper then made was what is called fuller's pressboards, such as are now used by clothiers to press cloth. * * *

As there were few books then published in the colonies, the progress of the paper manufacture was very slow, and so continued until about the dawn of the Revolution.

My grandfather manufactured the paper for Dr. Franklin, who was publishing a newspaper in Philadelphia, and who was a frequent visitor at the mill.

About the time my grandfather made the paper for the continental money he commenced making writing paper. * * *

The word "continental" in the above paragraph was probably intended for *colonial* or *provincial*. In the opinion of the present writer, Thomas Willcox did not make any paper for the continental currency.

Although he owned the mill until he died in November, 1779, he probably retired from the management of it about the time (1772) when he wrote his will. It will be seen later that his son, Mark Willcox, born in 1744, was operating the mill in 1776. He probably conducted it several years earlier, and made the paper for the first continental bills, the first issue of which was authorized by Congress on May 10, 1775.

In the "History of Delaware County," by H. G. Ashmead, 1884, it is stated: "Up to the time of the Revolution the paper for the money of all the colonies, from Massachusetts to the Carolinas, was manufactured by Thomas Willcox at his Ivy Mill, after which followed, out of the same mill, the paper for the Continental currency, and, after that, the paper for the Government issues made necessary by the war of 1812."

Benjamin Franklin frequently corresponded with Thomas Willcox. At one time, within the memory of a lady still living, there were many of Franklin's letters still preserved at the old homestead in Concord, but they have been lost or destroyed.

When Thomas Willcox died, in 1779, he bequeathed his farm and paper mill to his youngest son, Mark Wilcox, all the other sons having either died or moved from the ancestral home.

In 1776, a year of great anxiety, when our ports were blockaded by the enemy, and the importation of foreign paper rendered impracticable, an embarrassing need of that article prevailed throughout the country. More than half of the paper made in the colonies was at that time manufactured in the vicinity of Philadelphia, and Congress, realizing the necessity of keeping the paper mills in operation, on July 19, 1776, resolved "that the paper makers in Pennsylvania be excused from proceeding with the associators to New Jersey." Action was also taken, concerning this subject, by the Pennsylvania Council of Safety. In that body, on August 9, 1776, it was enacted that "the Honorable Congress having resolved that the paper makers in Pennsylvania be detained from proceeding with the associators to New Jersey, all officers of this State are required to pay a strict regard to the same."

The following extracts from letters will show the scarcity of paper at that period of our history. From letter of John Adams dated Philadelphia, April 15, 1776:

"I send you," he writes, "now and then, a few sheets of paper; but this article is as scarce here as with you. I would send a quire if I could get a conveyance." * * *

On May 6, 1776, Colonel Gilman wrote to the New Hampshire Committee of Safety: "My officers here make a great complaint for the want of paper. They cannot receive the necessary orders, and make proper returns of their companies, for want of that article. By the best information I can get, the

JOSEPH WILLCOX.

officers and commissioned officers in the Continental Army are allowed that article. I should be glad that the matter might be considered, and that you would grant such relief as you in your wisdom may think best."

On May 10, 1775, the first issue of continental bills was authorized by Congress; and, on the following June 23, Dr. Franklin and others were appointed a committee "to get the proper plates engraved, to provide paper and agree with printers to print the bills."

Another issue was authorized by Congress on November 29, 1775; and the committee on the state of the treasury was directed to contract for proper paper, and for the printing of the bills. All these were printed on plain paper.

In September, 1776, it was deemed desirable for the Government to own the moulds, and to supply to the printers, for the future issues of its currency, a paper containing watermarks. Nathan Sellers, then living in Darby township, Delaware County, was instructed to make the needful moulds, and he soon proceeded with the work, in order that the necessities of the Government should be supplied first.

An urgent necessity for more money was pressing in the autumn of 1776, and additional means for its supply became daily more imperative. On October 3, in that year, it was resolved, in Congress, "that five millions of continental dollars be immediately borrowed for the use of the United States at the annual interest of 4 per cent. per annum." * * *

Michael Hillegas was elected treasurer on July 29, 1775, by the Continental Congress; and John Gibson was elected auditor-general by Congress on April 9, 1776. Mark Willcox was authorized to make the paper for the loan-office certificates, and some of it was delivered in March, 1777, to Mr. Hillegas through Mr. Gibson. The original receipt of the auditor-general, in the hands of the writer, proves that one lot was loaded in a wagon at the mill and carried to Michael Hillegas in Baltimore, where Congress had been in session through the winter.

In the book "A Statement of the Accounts of the United States," by Robert Morris, superintendent of finances from 1781 to 1784, he claims credit for cash paid Mark Willcox, on December 26, 1782, for subsistence paper, $133.30. In the same book he claims credit for cash paid to Nathan Sellers, $103.30, on March 12, 1783, for a pair of moulds and box delivered to Mark Willcox for the use of the United States. It is not known to the writer what kind of paper was made on these moulds. The paper for the currency and for the loan certificates, for the State of Pennsylvania, was also made by Mark Willcox. A few sheets of the Pennsylvania paper are now in the possession of the Historical Society of Pennsylvania. They were made of unbleached linen; and they illustrate the impracticability, at that time, of obtaining bleached material for the manufacture of strong paper. These sheets, though printed, have never been used. The watermark "PENSYLVANIA" appears very conspicuously in this paper.

The first bills of Pennsylvania containing watermarks were dated April 10, 1777. Several sets of these bills were printed on the same kind of paper, containing twenty watermarks on each sheet. The denominations of three pence, four pence, six pence and nine pence were printed in sets of twenty-four notes in each sheet, but the denominations from one shilling to twenty shillings were printed in sets of twenty notes on each sheet, none of which contained more than twenty watermarks.

The paper taken by Colonel Boyd in March, 1778, from the mill was not paid for until 1783, as will be observed by the following extracts from the minutes of the Supreme Executive Council of Pennsylvania, in vol. 13, p. 536, of "Colonial Records."

"March 19, 1783. An order was drawn on the Treasurer in favor of Mark Wilcox for sixty-eight pounds specie, amount of his account for forty-eight Rms. of writing paper seized in the County of Chester in the year 1777, and afterwards made use of by Council."

Charles R. Hildeburn, of Philadelphia, lately presented to the writer a small sheet of paper, 6 x 7 inches in size, that undoubtedly was included in the lot of paper which Colonel Boyd took from the mill in March, 1778, for the use of the Council of Safety. It contains the characteristic watermark of the dove with olive branch, which was used by Mark Wilcox. The contents of this paper are inserted here, as they show the official estimate of the amount of the depreciation of the continental money at the time when the paper was signed:

"In Council Philadª September 8th 1780.

For £4,000. "Sir Pay to Honorable Jacob Arndt Esq or his order the amount of four thousand pounds Continental Money in State Money at Sixty for one, in part of his pay as a Member of this Board for which he is to account."—

"To David Rittenhouse Esquire "Wm Moore
"Treasurer." Vice President."

Outside of the writing on this sheet there is no margin of paper, as the most rigid economy was practiced in its use at that period.

The accounts of other papers made by Mark Willcox for the State of Pennsylvania and other States are known from the statements which he made to his son James and his wife. The old papers or records at Harrisburg pertaining to such transactions are in an accessible condition for reference.

The paper for the currency of South Carolina was made by Mark Willcox, but no evidence of it can be found in Columbia, the capital city of that State. After the paper was made the mould was delivered to the agent of South Carolina, as a receipt in the possession of the writer shows.

John Hill Martin, in his "History of Chester," says:

"When the old Colonies, much more than a century ago, found themselves obliged to issue paper money, the currency paper used by all of them was manufactured by Thomas Willcox, at Ivy Mills, and mostly printed in Philadelphia. No other currency paper was used upon the Continent than that made at the old Ivy Mill. Many years later in the necessities of the newly confederated States, the paper for all the Continental currency was supplied from the same establishment. There was no other possessing experience in the manufacture; and during the Revolutionary War paper could not be imported. Again, in the war of 1812, the Government was obliged to issue paper money, and again recourse was had to the old Ivy Mill to supply its necessities. At that time a distinctive paper, with colored silk shreds woven through it, was made for the Government's use; and the mill was guarded by the Government to prevent the paper from leaking out into unlawful hands."

Shortly after the Bank of North America was chartered by Congress, in 1781, an order was given to Mark Willcox, one of the original subscribers to its stock, for the manufacture of the paper for the notes to be issued by the bank. This paper was made at his mill in Delaware County under the supervision of an inspector named Joseph Pennell. After the paper was finished Mr. Pennell carried it to Philadelphia, having previously given a receipt for it to Mark Willcox, the original of which was surrendered upon the payment of the money for the paper, and is yet preserved by the bank.

This was undoubtedly the first lot of paper used for bank notes that was made in the United States. The appointment of an agent to supervise the manufacture of this paper, and the fact of his carrying it away from the mill, signifies that it was a paper of an unusual character. It was watermarked with the name of the bank. The notes were soon printed; and one of them, still preserved by the bank, indicates that the paper was unusually thin, and that it was made on a "laid-wire" mould. Each note contained the watermark: "NATIONAL BANK." This paper was not materially different from a strong, thin writing paper. In 1781 the officers of the bank concluded to issue another form of note, and a new mould was made, on which the paper was manufactured.

As early as 1783 Mark Willcox realized the necessity for a stronger paper for use as bank notes; and henceforward he used new linen stock in the manufacture of that class of paper. Russia sheeting and Irish linen were the usual materials employed in the manufacture of bank-note paper, at Ivy Mills, from that date until 1846; after which time any form of clean, unbleached, new linen fibre was rendered available, by means of improved processes for bleaching in the mill. The cost of this kind of linen often exceeded 50 cents per pound. It was a common practice at that period in the history of bank-note paper making for a bank to pay for the linen cloth and silk needful for its supply of paper, in addition to a certain stipulated price per 1,000 sheets for its manufacture. As a fancied additional security, to insure the production of the best

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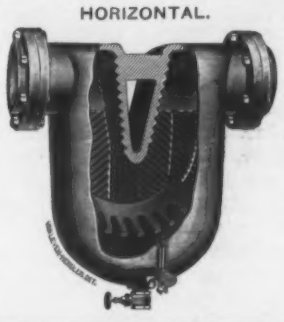
HORIZONTAL.



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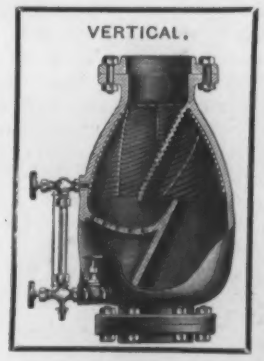

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quality of paper, an agent of the bank was frequently sent to the mill, who, although not a paper maker, remained there during the progress of the manufacture of the paper, which usually required a period of three or four weeks. The agent locked certain portions of the mill at night and kept the keys: and when the paper was finished he counted it, gave a receipt for it, and carried it to the bank or to the printer.

It was not unusual for a bank to own its moulds, in which case the name of the bank or its initials were watermarked, so that each note would contain the design.

Mark Willcox, on account of his many business engagements connected with his mill, and also with the firm of Flahnvan & Willcox, in Philadelphia, from 1773 to 1792, did not participate actively in many public affairs. He preferred the quiet life at his country home 18 miles from Philadelphia. Still his name appears to have been connected with several offices.

The only records of paper supplied by Mark Willcox to his brother-in-law, Matthew Carey, during the last century are contained in letters written by the former to the latter, which are still preserved by the descendants of Mr. Carey.

On February 13, 1792, Mark Willcox wrote to Matthew Carey: "I read your favor from Chester. Rest assured there has been no neglect on my part respecting the paper. With every exertion shall be able to send you some on Tuesday. I expect 6 or 7 Reams."

On March 14, 1792, he wrote: "I have sent you by the bearer eight Reams of paper; the roads are so bad I can't get the waggon to go before Tuesday next."

On November 27, 1792, he wrote: "I send by the bearer, Mr. Miller, 4 Reams fine Demy. Expect to send more this week by Friday evening."

In letter dated December 22, 1794, he stated: "I shall in a few days begin more paper for you. Shall send some up as soon as I can."

"N. B. I have sent 10 bundles of paper for Mr. Humphries to your care. Please let him know."

In a letter, without date, he wrote: "I have sent by stage 6 Reams fine Medium. Shall send some seconds in 2 or 3 days."

In 1790 Carey, Stewart & Co. published an edition of the Bible, the Douay version. Among the list of subscribers the name of Mark Willcox appears for six copies.

In 1791 Matthew Carey's store was at No. 22 North Front street, Philadelphia. In 1794 it was at No. 118 High street.

It was formerly a common practice for paper makers to watermark their paper, in order that it might be easily identified as the product of their mills. In addition to their names or initials on one half of the sheet, they put some device on the other half, to which they claimed a title, as a trademark, and which was respected by the paper-making fraternity. Only two exceptions to this custom are known to the writer.

A writing paper containing the initials T M W and also a dove with an olive branch is believed by the writer to have been made on moulds owned by Thomas Willcox. Such paper was used in the office of the Supreme Court of Pennsylvania, in 1778-9, by Edward Burd, the clerk, and sheets of it are still on file in the office of that court in Philadelphia. Such paper was also used by Thomas Taylor, register of wills for the county of Chester, in 1779. The paper in Will Book S, 1781, in the register's office in Philadelphia also contains the same watermarked initials, T M W, but not the dove.

The belief is strengthened by the fact that Mark Willcox, the son and successor of Thomas Willcox, also used the same watermark of the dove with the olive branch, in addition to his initials M W, in paper dated as early as December 5, 1779. It is believed by the writer that some of the above-mentioned papers may have been made by Mark Willcox on moulds formerly owned by his father, from which the watermarks had not been removed, a custom not uncommon with paper makers. The writer has frequently made paper on moulds formerly owned by his father, from which the watermarked name of the latter had not been removed.

Mark Willcox also used the figure of a powder horn, in conjunction with his initials M W, on some of his papers as early as August 13, 1787.

Joshua Gilpin also used the same design in some of his paper, a sheet of which in the possession of the writer is dated "Decr 4th 1789." It also contains the name, watermarked, "J. G. & Co. Brandywine."

On September 1, 1808, Mark Willcox admitted his eldest son, Joseph, into partnership, giving to him one-third in the profits of the business. The latter was born in August, 1788. On June 1, 1811, he gave a third interest in the business to his son John, born in April, 1789.

Joseph died in January, 1815, after which date John superintended the operations of the mill until he died, in July, 1826.

At a meeting of manufacturers of Delaware County, held in 1825 or the early part of 1826, a committee consisting of William Martin, George G. Leiper and John Willcox was appointed to ascertain the number of mill seats and manufactories in Delaware County, and to make a report of the same at a future meeting. Before the report was submitted John Willcox died.

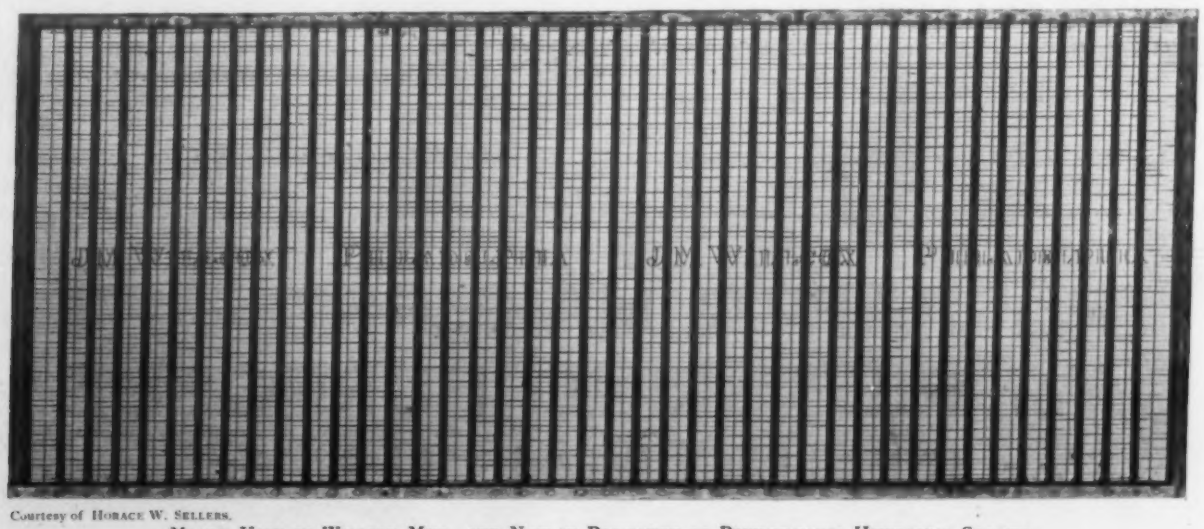
After the death of John Willcox, in 1826, his brother, James M. Willcox, born in April, 1791, assumed the management of the paper mill; and on February 17, 1827, when his father, Mark Willcox, died, he inherited the mill from him.

In 1829 the old mill, which had been running 100 years without interruption, was torn down; and a new building was erected on the same site, which was put in operation in December in that year.

The use of bank-note paper rapidly developed, and in the course of a few years, in 1836, additional machinery was introduced to increase the production.

While the paper mill was operated by John Willcox he received orders from several of the South American states for watermarked bank-note paper.

Among the papers of the latter, in the possession of the writer, is one in his handwriting, stating that from September 14, 1825, to the following October 24, the mill was making bank paper for the Bank of Buenos Ayres. James M. Willcox also supplied many orders for watermarked paper for South American countries, and several lots of the same character were manufactured by the writer.



Courtesy of Horace W. Sellers.

Mould Used in Willcox Mill, and Now in Possession of Pennsylvania Historical Society.

After the year 1832 the mill was engaged almost wholly in making bank paper, until the death of James M. Willcox, which occurred on March 4, 1854.

From that time the mill was operated by his sons, Mark, James and Joseph Willcox, under the firm name of J. M. Willcox & Sons, until November, 1859, when it passed into the possession of his youngest son, Henry B. Willcox. The latter continued to manufacture paper there until March, 1866, when the business of manufacturing hand-made paper was abandoned.

On October 20, 1850, James M. Willcox sent a printed circular, with samples of bank paper, to all of the banks in the United States. In it he stated he had made the manufacture of bank-note paper, for the last twenty years, almost an exclusive business. This referred only to the department of hand-made paper, as he at that time owned two mills (in which paper was made on Fourdrinier machines), one erected in 1837, and the other in 1845, at Glen Mills, 2½ miles from Ivy Mills.

Soon after the mill came into the possession of James M. Willcox, in 1827, he adopted the watermark of the ivy leaf, in addition to his name, J. M. Willcox, Philad^a. As his business was chiefly confined to the manufacture of bank-note paper, he did not make large quantities of other paper in the hand-made paper mill.

In July, 1843, James M. Willcox supplied to the Treasury Department two classes of watermarked paper. One class consisted of large sheets for bonds, containing the name U. STATES in large letters. The other class, amounting to 35,000 sheets, was intended for treasury notes, each sheet containing the name and figures, UNITED STATES 50, in three places.

By an act of Congress approved March 31, 1848, the President was authorized to borrow a sum not exceeding $16,000,000. In the following summer James M. Willcox supplied 26,000 sheets of bond paper for this loan, which required three classes of paper, presumably for three series of bonds, of as many denominations of value. Two of the classes were watermarkedwith the words UNITED STATES and the design of an eagle, in sheets of two sizes. The other class consisted of plain paper. All of this paper was sent to Messrs. Rawdon, Wright, Hatch & Edison to be printed in New York.

After the last-mentioned date all of the bond paper supplied to the Treasury Department from Ivy Mills and from Glen Mills consisted of plain paper, without watermarks.

It has been previously stated that in former times it was a common practice for a bank to own its moulds, and to pay separately for the linen and silk used, in addition to the cost of manufacturing the paper.

The paper for the Bank of the United States was made at Ivy Mills, the first mention concerning which that has been observed by the writer was dated in September, 1809, which will be referred to later in this paper. Nicholas Biddle, the president of this bank, devoted much consideration to the subject of various devices for the prevention of counterfeiting the notes of the bank, and George Escol Sellers conducted some experiments at Ivy Mills to demonstrate the practicability or impracticability of some of Mr. Biddle's contrivances, soon after the latter was elected president of the bank.

The orders for paper for this bank were sometimes given by Mr. Biddle, at other times by the cashier. The paper contained the name of the bank, in full, watermarked in each note. In 1829 the bank increased the size of the paper for its $20 bills.

In November, 1829, the Bank of the United States had a plate engraved for its $100 bills which required a still larger paper, which was a plan adopted to prevent the alteration of notes to a higher denomination. In January, 1830, the mill book shows that 22,500 sheets of the large size, and the same number of the small size, were made for the bank.

On April 18, 1838, the Legislature of the State of New York passed an act to authorize the business of banking. The comptroller was empowered to make contracts for the bank-note paper, for engraving the plates and for printing the notes. The notes were to be issued to the banks upon the deposit, with the comptroller, of State and municipal bonds and of mortgages on real estate in New York, to be approved by him.

The contract for the paper was awarded to James M. Willcox. New moulds were made for watermarked paper; and thick paper was used, as the notes were printed on each side.

After that date the custom of printing both sides of bank-notes became more popular, and a greater demand was made for a thicker and more opaque paper than formerly.

In September, 1851, 50,000 sheets of paper were made for the Ohio State Stock Bank, by James M. Willcox. In this paper the name of the bank, in full, was watermarked in each note. The last lot of watermarked bank paper manufactured at Ivy Mills was made for the Bank of Montreal in 1861, 100,000 sheets. Each note contained the letters B M.

The range in the thickness of bank paper in former times varied from 12 to 10 pounds per 1,000 sheets, each sheet making eight notes. As a general rule the banks in the Southern States preferred thin paper for their notes.

In March, 1825, Messrs. Fairman, Draper, Underwood & Co., bank-note engravers and printers, ordered a pair of moulds to be made with their initials so watermarked as to appear in each note. On November 14 in that year they wrote to John Willcox: "The paper you are about to make us we wish to be on *our own moulds.* The texture and thickness of that of the Philadelphia Bank will be quite satisfactory." * * *

The severe ordeal to which bank notes in this country are subjected soon obliterated the watermarks in the paper; and that plan in a few years practically passed into disuse for bank notes.

In 1858 Messrs. Toppan, Carpenter, Casilear & Co. and Wellstood, Hanks, Hay & Whiting, bank-note engravers and printers, concluded to use a paper with their initials watermarked to appear in each note, in a manner so conspicuous that they would not easily be effaced by moderate usage. This plan required the use of large wire for the letters on the moulds; but the paper made on them did not prove to be satisfactory. The film of paper on the letters was too thin in proportion to the paper in the body of the sheet; and these thin portions were soon ruptured by hard usage.

Shortly after the issue of $50,000,000 of "demand notes" had been authorized by the acts of Congress, in July and August, 1861, the Secretary of the Treasury, Hon. Salmon P. Chase, ordered the needed paper from J. M. Willcox & Sons. The hand-made paper mill at Ivy Mills was not able to supply the sudden and unprecedented demand for bank-note paper; and the business was transferred to one of the mills owned by Mark, James and Joseph Willcox, at Glen Mills, 2½ miles distant from Ivy Mills, where the paper was made on a Fourdrinier machine. At a later date, when large quantities of bond paper were also ordered by the Treasury Department, two machines were required to manufacture the necessary paper.

When the Secretary of the Treasury ordered the first lot of paper for the "demand notes," he concluded upon the weight of 20 pounds per 1,000 sheets, to make the proper thickness for the paper, against the advice of the paper makers, and especially against the protest of the writer. The chief purpose of the secretary, when selecting such heavy paper, appeared to be to prevent the printing from showing through the paper.

Courtesy of the American Catholic Historical Society.

The Ivy Mills.

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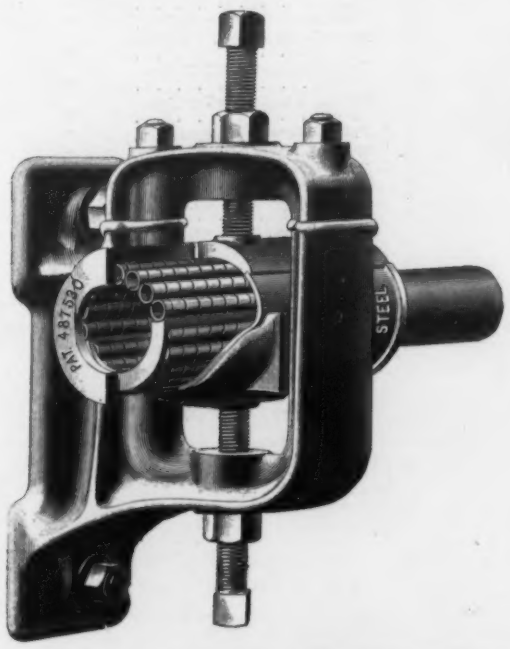

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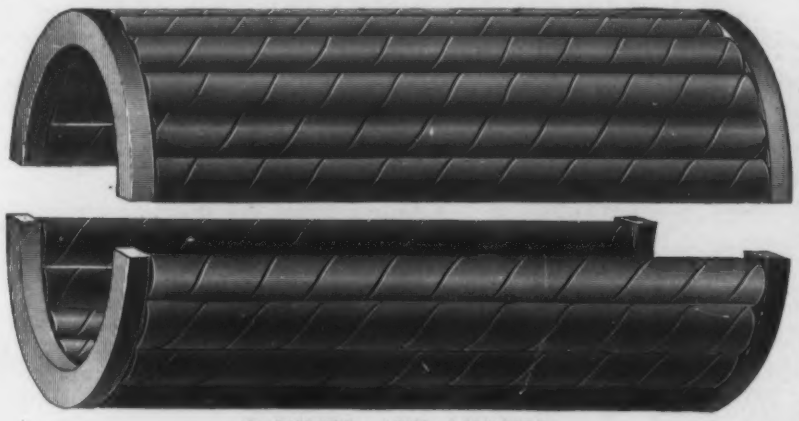

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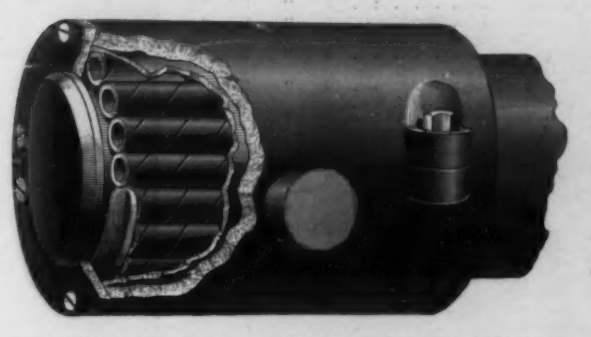
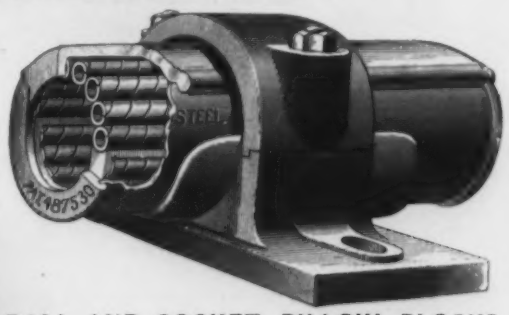


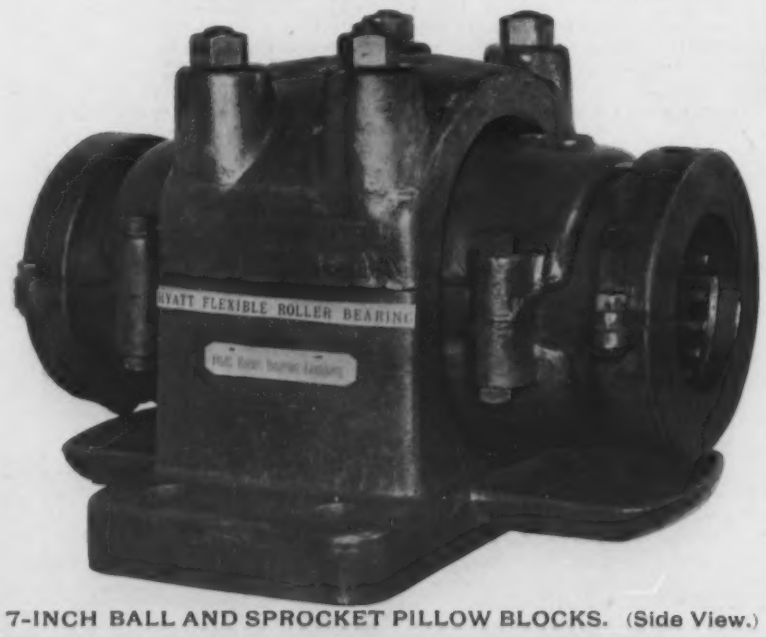
BEATING ENGINE BOX WITH TRUNNIONS.

We supply makers of beating engines with rollers and guides, also with steel sleeves and linings, for the protection of the cast iron journals and boxes. We also make complete boxes either for old or new work, if specifications are furnished.

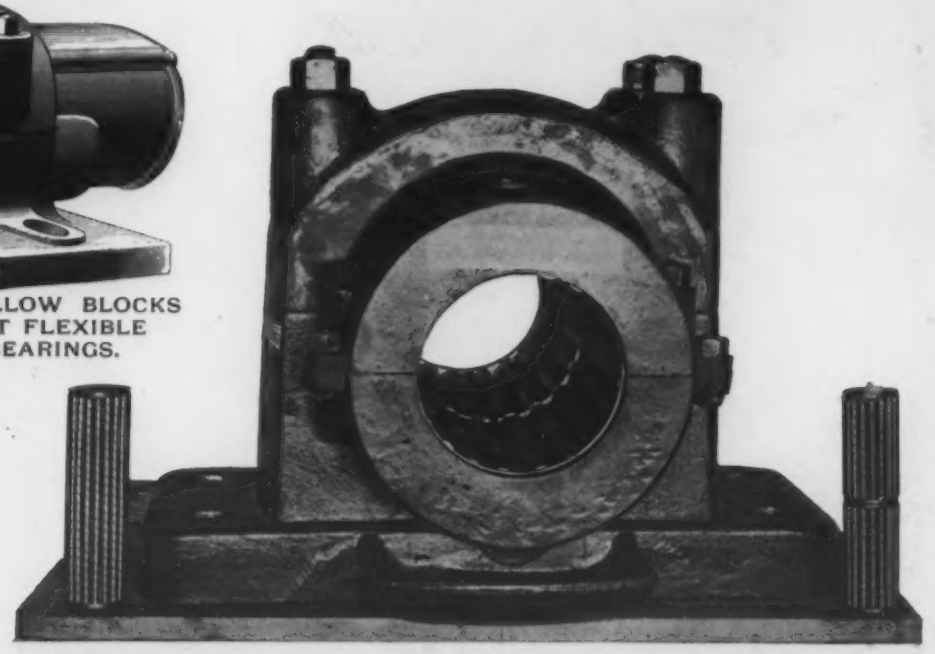
HYATT FLOOR STANDS.



BALL AND SOCKET PILLOW BLOCKS WITH HYATT PATENT FLEXIBLE BEATING ENGINE BEARINGS.



7-INCH BALL AND SPROCKET PILLOW BLOCKS. (Side View.)



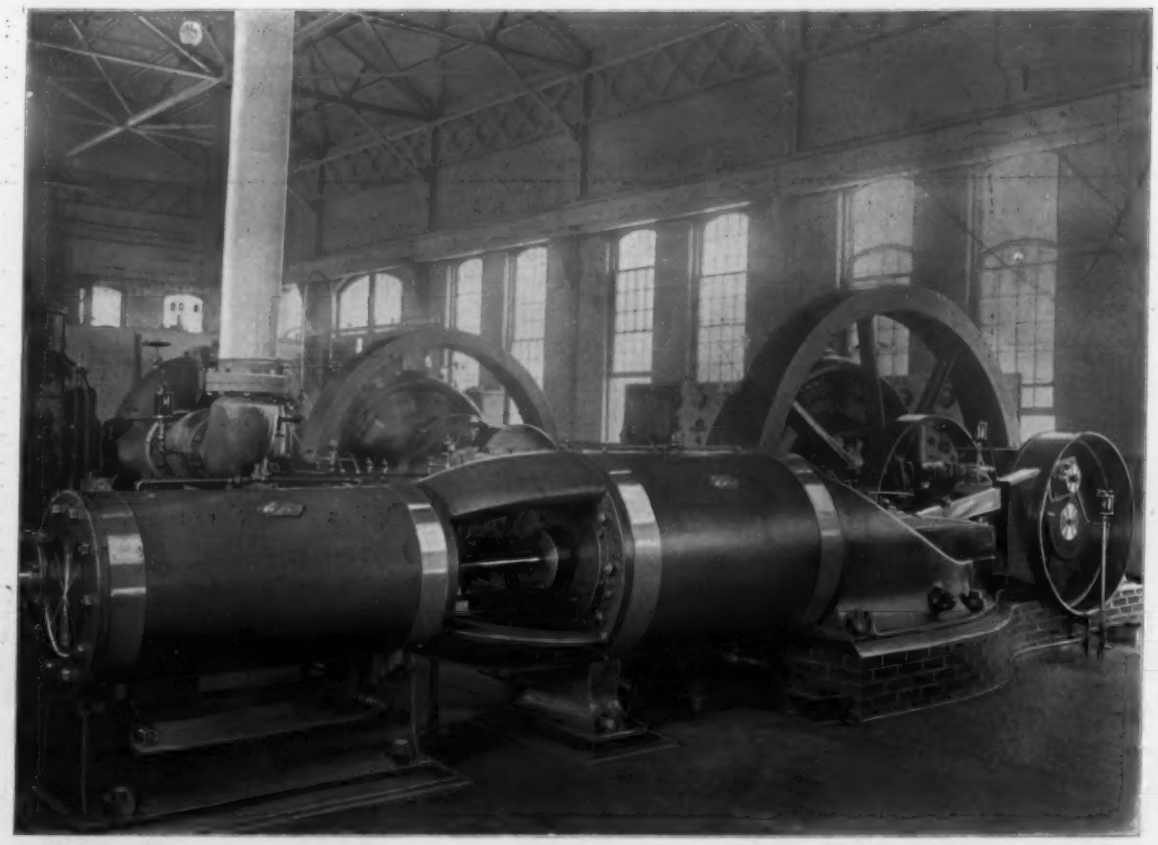
7-INCH BALL AND SOCKET PILLOW BLOCKS. (End View.)

LOOK AT LIST OF PAPER MILLS USING

Buckeye Engines.

LIST.

American Straw Board & Paper Co., Dayton, Piqua, New Portage, Kokomo and Noblesville,	21	engines,	2653 H. P.
S. D. Warren & Co., Cumberland Mills, Pepperell and Gardiner, Me.	14	"	1405 "
George West, Ballston Spa, N.Y.	12	"	858 "
Jessup & Moore Paper Co., Wilmington, Del.,	7	"	490 "
Geo. H. Friend Paper Co., W. Carrollton, Ohio,	5	"	695 "
Crane & Co., Dalton and Westfield, Mass.,	4	"	380 "
John Lang, Philadelphia, Pa.,	4	"	585 "
West Virginia Paper Co., Piedmont, W. Va.,	4	"	435 "
West Virginia Pulp Co., Davis,	4	"	325 "
Hollingsworth & Whitney, S. Braintree and Waterville, Me.	3	"	280 "
American Wood Paper Co., Manayunk, Pa., and Spring City,	3	"	465 "
Mead Paper Co., Dayton and Chillicothe, Ohio,	3	"	458 "
Fox Paper Co., Lockland, Ohio,	3	"	228 "
Peter Adams Paper Co., Buckland, Conn.,	3	"	510 "
James Peters & Co., Latrobe, Pa.	3	"	522 "
Wilkinson Bros. & Co., Birmingham, Conn.,	3	"	190 "
Piedmont Pulp and Paper Co., Piedmont, W. Va.,	3	"	390 "
West Muncie Straw Board Co., Yorktown, Ind.,	3	"	335 "
Perrine Paper Co., Franklin, O.	2	"	300 "
The White Paper Co., Dayton, Ohio,	2	"	347 "
Hulbert Paper Co., South Lee, Mass.,	2	"	230 "
Chestertown S. B. & P. Co., Chestertown, Md.,	2	"	235 "
Jackson Paper Co., Jackson, Mich.,	2	"	280 "
Tarentum Paper Co., Tarentum, Pa.,	2	"	447 "
Hartford Manilla Co., Burnside, Conn.,	2	"	300 "
Alex. Balfour, Philadelphia, Pa.	2	"	400 "
Union Straw Board Co., Anderson, Ind.,	2	"	94 "
Cleveland Paper Co., Cleveland, Ohio,	2	"	505 "
Cumberland Paper Co., Cumberland, Md.,	2	"	218 "
S. George, Wellsburg, W. Va.,	2	"	250 "
Indiana Pulp and Paper Co., Marion, Ind.,	2	"	1000 "
Tytus-Gardner Paper and Mfg. Co., Middletown, Ohio,	2	"	230 "
Jay Paper Co., Jay Bridge, Me.,	2	"	250 "
Geo. N. Friend, Rockdale, Ohio,	1	"	325 "
Hagar Straw Board and Paper Co., Cedarville, Ohio,	1	"	225 "
Vincennes Paper Co., Vincennes, Ind.,	1	"	185 "
Richards & Co., Gardiner, Me.,	1	"	120 "
Albany Card and Paper Co., Albany, N. Y.,	1	"	100 "
John McLean, Ballston Spa, N. Y.,	1	"	70 "
Tippecanoe Paper Co., Tippecanoe City, Ind.,	1	"	125 "

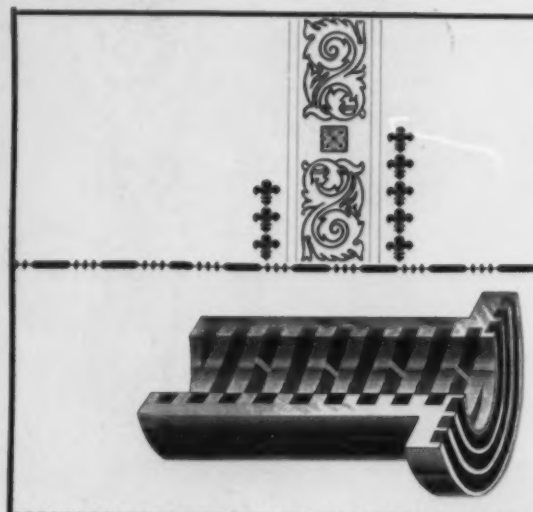


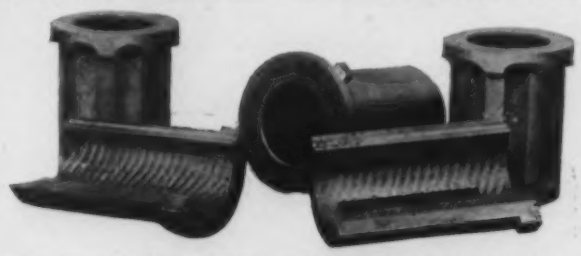
BUCKEYE ENGINE CO.,

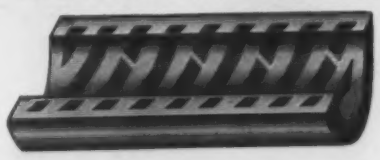
SALEM, OHIO, U. S. A.

LIST.

Wrenn Paper Co., Middletown, Ohio,	1	engine,	130 H. P.
Eagle Paper Co., Franklin, Ohio,	1	"	225 "
Oglesby, W. B., Paper Co., Middletown, Ohio,	1	"	90 "
Harvey Paper Co., Wellsburg, W. Va.,	1	"	110 "
Amour Brothers, Stanley, N. J.,	1	"	425 "
Ticonderoga P. and P. Co., Ticonderoga, N. Y.,	1	"	65 "
Jersey City Paper Co., Jersey City, N. J.,	1	"	100 "
Stewart Paper Co., Brookville, Ind.,	1	"	140 "
Ohio Paper Co., Niles, Mich.,	1	"	85 "
S. Y. Beach Paper Co., Seymour, Conn.,	1	"	35 "
Elsas, May & Co., Atlanta, Ga.,	1	"	90 "
Franklin Paper Co., Franklin, Ohio,	1	"	70 "
Jacoby Paper Co., Middletown, Ohio,	1	"	90 "
John Hey & Co., Valley Forge, Pa.,	1	"	115 "
F. W. McDowell, Manayunk, Pa.	1	"	120 "
Midland Paper Co., Xenia, Ohio,	1	"	108 "
Wisconsin Sulphite Fibre Co., Monica, Wis.,	1	"	105 "
A. W. Collins Mfg. Co, Philadelphia, Pa.,	1	"	18 "
House & Co., Rainbow, Conn.,	1	"	105 "
Ohio Paper Bag Co., Middletown, Ohio,	1	"	70 "
St. Clair Paper Co., Detroit, Mich.,	1	"	34 "
Glens Falls Paper Co., Glens Falls, N. Y.,	1	"	75 "
Gardner Paper Co., Middletown, Ohio,	1	"	101 "
Riverside Paper Co., Holyoke, Mass.,	1	"	75 "
New York and Penna. Co., New York,	1	"	57 "
Haldeman Paper Co., Lockland, Ohio,	1	"	257 "
W. P. Holliday, Detroit, Mich.,	1	"	61 "
Richmond Paper Mfg. Co., Richmond, Va.,	1	"	57 "
Hanmer-Forbes Co., Burnside, Conn.,	1	"	100 "
Wardlow-Thomas Paper Co., Middletown, Ohio,	1	"	125 "
Davis & Richmond, Valatie, N. Y.,	1	"	86 "
Syms & Dudley Paper Co., Watervliet, Mich.,	1	"	125 "
American Copying Paper Co., Woods Station, Conn.,	1	"	73 "
Oglesby Paper Co., Middletown, Ohio,	1	"	85 "
Glen Mfg. Co., Berlin, N. H.,	1	"	85 "
Ohio Valley Paper Co., Amanda, Ohio,	1	"	70 "
Muncie Pulp Co., Muncie, Ind.,	1	"	70 "
Marseilles Wrapping Paper Co., Marseilles, Ind.,	1	"	30 "
Mentzel Paper Co., Cella, Md.,	1	"	150 "
Western Paper Bag Co., Kaukauna, Wis.,	1	"	175 "
Alpha Paper Bag Co., Franklin, Ohio,	1	"	70 "
Miamisburg Paper Co., Miamisburg, Ohio,	1	"	85 "







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sang the Greek Bard, and the outcome of the late war has proved how eminently wise his suggestion was. The war ended just as we said it would, before it began.

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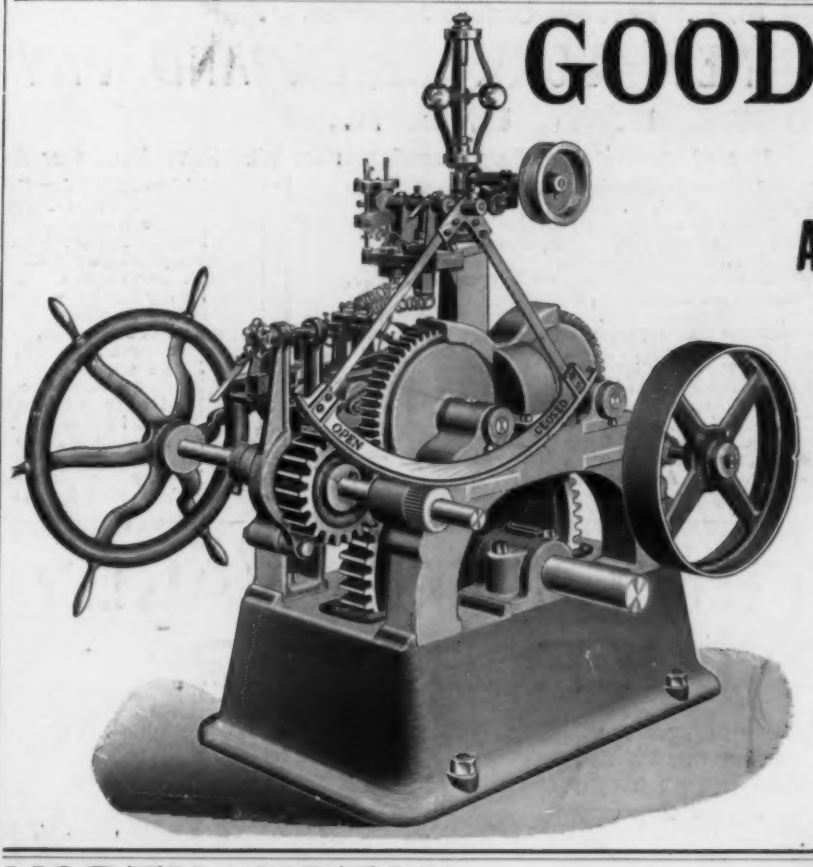

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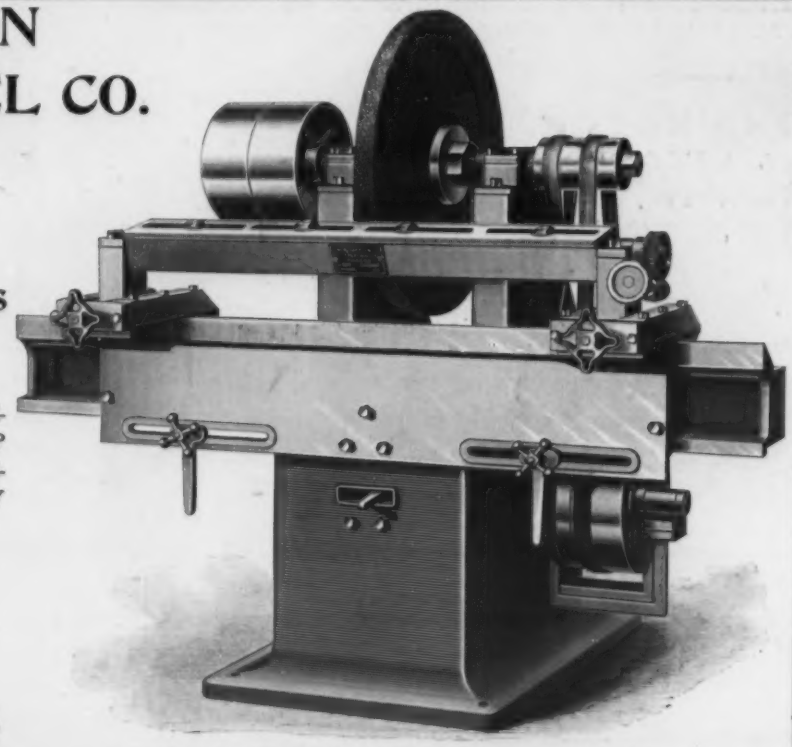

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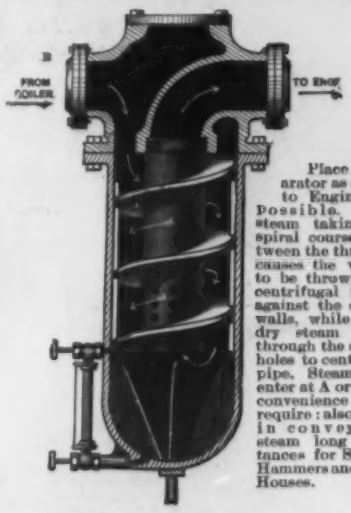

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Combined Locks Paper Co., Appleton, Wis.
High Falls Mining Co., Canton, N. Y.
Fall Mt. Paper Co., Bellows Falls, Vt.
Umbagog Pulp Co., Livermore Falls, Me.
Russell Paper Co., Lawrence, Mass.
Weymouth Manufacturing Co., Elwood, N. J.
Willamette Pulp Co., Oregon City, Oregon.
Richards Paper Co., South Gardiner, Me.
Ashland Sulphite Pulp Co., Ashland, Wis.
Cushnoc Fibre Co., Augusta, Me.
Lisbon Falls Fibre Co., Lisbon Falls, Me.
Riverside Fibre Co., Appleton, Wis.
Sebago Woodboard Co., Portland, Me.
Riordan Paper Mills Co., Merritton, Ont., Canada.
Walpole Dye and Chemical Works, Walpole, Mass.
Toronto Paper Co., Cornwall, Ontario, Canada.
Solvay Process Co., Syracuse, N. Y.
Solvay Process Co., Detroit, Mich.
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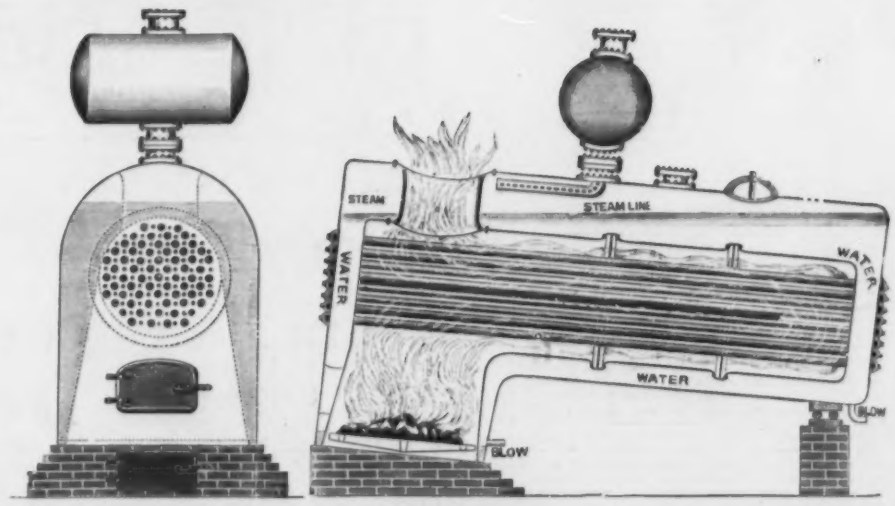

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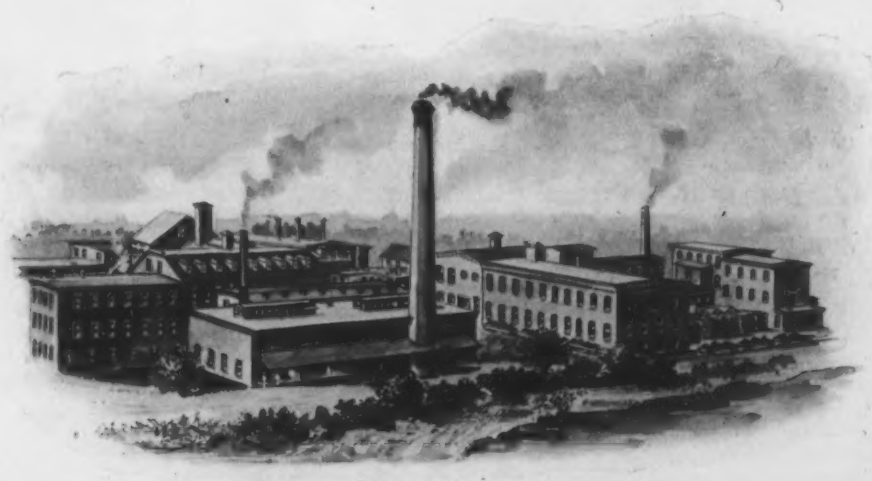
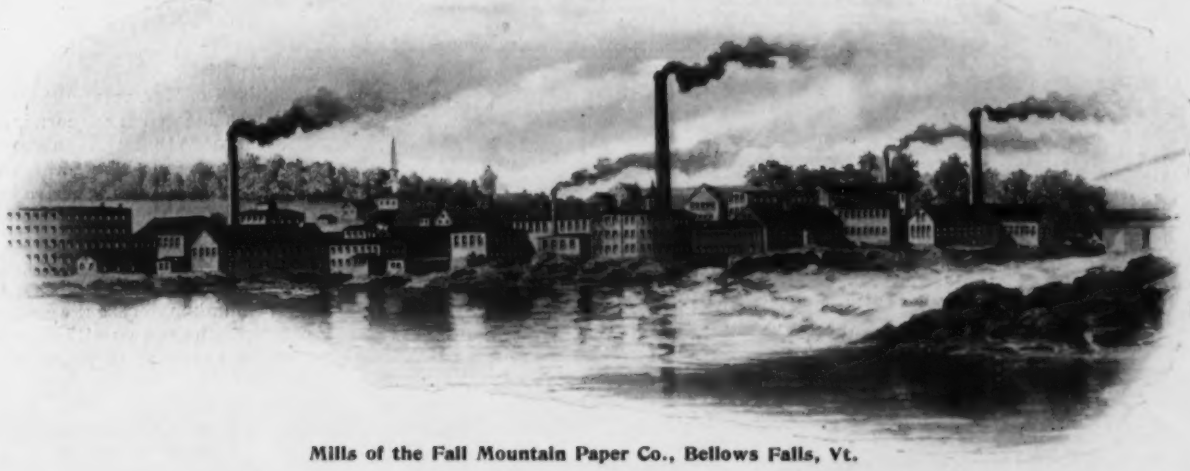
BOSTON OFFICE, 85 Water Street.



Mills of the Russell Paper Company, Lawrence, Mass.

FALL MOUNTAIN PAPER CO.,

MILLS AT
BELLOWS FALLS, VT.



Mills of the Fall Mountain Paper Co., Bellows Falls, Vt.

MANUFACTURERS OF

News, Double Manilla,

Card Middle and Coated Papers,

ALSO

SPECIALTIES.

W. A. RUSSELL, President. A. N. BURBANK, Treasurer.

Boston Office, 85 Water St.

WINNIPISEOGEE PAPER CO.,

FRANKLIN FALLS, N. H.

MANUFACTURERS OF

FINE NEWS PAPER,

COLORED POSTERS AND No. 2 BOOK PAPER.

W. F. DANIELL, President.
A. N. BURBANK, Treasurer.
E. S. DANIELL, Assistant Treasurer.

BOSTON OFFICE, 85 Water Street.

THE MT. TOM SULPHITE CO.,

MT. TOM, MASS.

MANUFACTURERS OF

FINE BLEACHED SULPHITE PULP.

W. A. RUSSELL, Prest. and Treas.

Treasurer's Office,
85 Water Street,
BOSTON, MASS.

Mt. Tom Sulphite Co.'s Mills at Mt. Tom, Mass.

When the next lot of paper was ordered for the "legal tender notes," authorized by act of Congress on February 25, 1862, a thinner grade weighing 18 pounds per 1,000 sheets was selected, which proved to be satisfactory, and which was subsequently adopted as the standard of thickness for all national notes.

After the adoption of the so-called "localized fibre" (patented by James M. Willcox) paper, in 1870, all of the bonds, notes and fractional currency were printed on such paper.

Before Jay Cooke & Co. were appointed the agents for the sale of the so-called "7-30" and "5-20" bonds, these bonds were sold so slowly that the expenses of the war were chiefly paid with the legal tender notes, which were issued as fast as the paper could be made and printed.

Among the precautions taken to prevent the counterfeiting of the bills of some of the colonies and States during the last century, the use of scales of the mineral mica is conspicuous in some of the paper. Such scales are apparent in the bills of New York, Pennsylvania, Delaware, Maryland, Virginia, North Carolina and probably other colonies and States. They are visible also in some of the issues of the continental bills. They may be seen in notes dated as early as 1764.

It is not known to the writer who first introduced this plan, nor does he know when paper was first made on vellum moulds. In a late communication from Lewis Evans, in England, received through the courtesy of Dr. Garnett, keeper of printed books in the British Museum in London, he stated that he has a copy of a book, printed in Birmingham in 1857, many sheets of which are printed on wove or vellum paper.

The oldest vellum paper seen by the writer, presumably made in America, was used for printing the bills of Maryland, which were dated December 7, 1775. The small notes of the Bank of North America of small denominations, dated August 5, 1789, were printed on vellum paper by F. Bache. But vellum moulds were not used extensively for making paper in America during the last century.

The use of laid wire moulds for manufacturing bank paper was probably abandoned early in the present century.

A list of the standard sizes of moulds used in the manufacture of hand-made paper is here given, as it may possess a future historical value. The paper usually contracted in size to the amount of 3 or 4 per cent., in the process of drying. Bank paper was on foolscap moulds:

Foolscap	14¼x16¼ in.	Extra Royal	21½x25½ in.
Littrice	15¼x16¼ "	Super Royal	20¼x27½ "
Demy	16 x21 "	Imperial	22½x30½ "
Post	17 x21½ "	Manslaughter	22 x32 "
Medium	18 x23 "	Atlas	26½x33 "
Royal	21 x24 "		

Each ream of paper, of any grade, consisted of eighteen quires of that particular quality and two quires of broken sheets, which latter were placed one on top and one on the bottom of each ream. A reduction was made in the price of the paper according to its reduced quality. Many newspapers were printed on paper of the second or third quality.

After the death of Thomas Willcox, in 1779, his personal property was appraised by Persr. Frazer and Norris Jones. In the inventory were included eight slaves, whose names are here inserted, to show their estimated values at that period of our history:

A mulatto man named Sylvester, to serve three years,	£20
A negro man named Prince, ...	30
A negro man named Cæsar, ...	100
A negro woman named Peg, ...	55
A negro girl named Luce (thirteen years old, see below),	60
A negro boy named Tim, ...	35
One negro boy named Luke, ...	35
Young girl Suck, ...	20

According to the family traditional account several of the above-mentioned slaves, including Cæsar, were purchased by Thomas Willcox from a captain of a slave-trading vessel that was anchored in Delaware Bay.

The following baptisms, registered at St. Joseph's Church in Philadelphia, attest the solicitude of Thomas Willcox for the spiritual welfare of his slaves:

"May 4, 1767. At Concord, Lucie, of Sylvester, born April 7, sponsors Thomas and Elizabeth Willcox. Slave of Willcox.*

"January 10, 1770. Cæsar, servant of Thomas Willcox, adult, in Chester County.

"April 1, 1770. Ruth, of Sylvester and Margaret, slaves of Thomas Willcox, born March 5."

The following has been copied from the register at St. Mary's Church in Philadelphia:

"1789, August 10, at Concord, by Rev. Fras Beeston, negroes Prince and Lucy."

Cæsar was a faithful man and an intelligent workman. He worked as a paper maker in the mill from May, 1798, to January, 1804. He remained in the service of the family until he was superannuated, and was then supported by James M. Willcox, until the former died in November, 1834. He was buried in the family cemetery at Ivy Mills. Prince's name appears among the workmen in the mill from July, 1800, until September, 1801.

During the latter part of her life "Suck," whose married name was Norman, lived near Chester, where she died about 1845.

The following is a list of the foremen who superintended the work at the paper mill after the year 1790:

Thomas Willcox*	from	January 4,	1790 to	April 1,	1810
John Bowers	"	April 1,	1810 "	August 1,	1822
John Gilmore	"	August 1,	1822 "	September 28,	1828
John Mooney	"	September 28,	1828 "	October 15,	1834
Thomas Mooney	"	October 20,	1834 "	June 25,	1853
John Palmer	"	June 27,	1853 "	October 31,	1865

The writer has been able to ascertain that the names of the following persons have appeared on the list of employees at the mill for a long time. In some cases of long service there were some intermissions.

John Bowers appeared on the list from October 1, 1788, to January 17, 1789, and from December 1, 1799, to August 21, 1802, and from June, 1808, to August, 1822.

	Date of first appearance on the list.		Last date on the list.	
Bishop Bratton	June,	1810	May,	1838
William Bowers	April,	1808	August,	1838
Mary Bowers	April,	1808	March,	1828
Thomas Cochran	May,	1810	February,	1826
Mary Evans	July,	1817	November,	1841
John Mooney	November,	1805	October,	1834
Betsey Mooney	June,	1806	October,	1854
Margaret Mills	June,	1816	December,	1837
William Pierce	June,	1829	November,	1849

William Pyle, when a boy, was apprenticed to James M. Willcox in July, 1827. After many years of service at Ivy Mills he removed to Glen Mills, where he was employed in one of the paper mills until February, 1885. He died in August, 1888. He was esteemed through his career of life as a faithful, industrious and skillful paper maker.

IN OLD KENTUCKY.

Paper Manufacturing Begun at Georgetown, in That State, in 1793.

The honor of having erected the first paper mill west of the Susquehanna River belongs to Kentucky, the first mill in the State having been built at Georgetown in 1793. In the *Gazette* of Lexington, Ky., appeared the following:

January 1, 1791.—"Any person understanding paper making or the construction of a paper mill, will please apply at this office."

April 7, 1792.—"A Paper Mill.—The subscribers inform the publick that they have undertaken to build a paper mill at Craig's Fulling Mill, Woodford County, Ky. They flatter themselves that they will be able to supply the district with paper this coming winter, if the publick will be so obliged to save their rags for the purpose, without which we need not inform them the mill will be useless. We therefore earnestly request them to save their rags. CRAIG & LOGAN."

March 29, 1793.—"Craig, Parker & Co.'s paper manufactory is actually making paper. We make no doubt but that in the course of the spring we shall be able to furnish the State in all kinds of paper, providing we can get a sufficient supply of rags, nor have we any reason to fear, from the success we have already had in collecting rags, but we shall be plentifully supplied. We earnestly hope that the importance of the manufactory to the State at large is a sufficient argument to induce them to save their rags."

1793.—"Wanted, at the Georgetown paper mill, four or five boys to learn the trade. CRAIG, PARKER & Co."

March, 1794.—"Writing and wrapping papers for sale at this office by the ream."

In his history of Kentucky, Marshall says:

"In 1792 a paper mill, the first which had been attempted in Kentucky, was in progress and near completion. For this establishment, which promises to be useful, the country was indebted to the exertions of Craig & Parker. It was near Georgetown, and soon after rendered production."

Another writer states that the *Gazette* was printed on paper made at the mill of Craig, Parker & Co. In his history of Kentucky Collins says:

"The first paper mill was built at Georgetown by the Rev. Elijah Craig, a Baptist preacher, and his partners, Parker & Co. The enterprise began in the summer of 1791, and the manufacture of paper successfully was not accomplished until March, 1793." Collins further says: "Here was turned out the first sheet of paper in the great West, made by hand, sheet by sheet. The first mill was burned down in 1837."

Elijah Craig came of a family celebrated in American annals, and he was the holder of considerable property in Frankfort, Ky.

Between 1800 and 1805 Isaac Yarnall built two single-vat paper mills about 6 miles west of Lexington, and a one-vat mill was also started in Logan County, not far from its southern line. During the first decade of the present century there was a paper mill at Great Crossing, on the Elkhorn, but whether that was Craig's mill is not known.

An emigrants' directory issued at Auburn, N. Y., in 1817, and compiled by Samuel R. Brown, mentions that in the State of Kentucky there were seven paper mills, and that at Lexington there were two steam paper mills.

The first paper mill in Louisville, Ky., was built in 1814 by the firm of Jacob & Hicks, and was located at the corner of Twenty-second and Maple streets, where at that time there were ponds and a run of water connecting them. That mill sold a large amount of its product to the *Western Courier*, a newspaper which was started four years before the mill.

The second mill within the limits of the city of Louisville was started about 1830 or 1832. Originally it was a saw mill and was located in the woods adjoining the town. When all the trees which could be cut for lumber were cut up, Bainbridge & Syler, the proprietors, changed their saw mill into a paper mill. It ran on printing paper for about three years and was then burned down.

The third mill in the city was built about 1836 and was operated by Nixon & Kellogg, and was subsequently purchased by Mr. Penn, of the Louisville *Advertiser*. Later it became the property of Prentice & Co. In 1840 it was rebuilt at a cost of $9,000 by Prentice, Weissinger & Co., but they did not long retain possession of it. A few years later it was sold under the hammer to Isaac Cromey for $14,000. This was the first mill operated in Louisville by Dupont & Co.

In 1820-21, Amos Kendall, who afterwards became postmaster-general in the cabinet of Andrew Jackson, built the Franklin Mill on Main Elkhorn, a mile and a half below what is known as the Forks of Elkhorn, a Kentucky village of considerable size. A year previous to this there had been some talk of the Federal Government establishing an armory in that locality and Mr. Kendall purchased the property on speculation. He began the erection of his mill in the summer of 1820, and it was completed early in 1821. Later the property was purchased by E. H. Steadman, and was operated by him and others with only indifferent financial results. In 1875 it was purchased by Dupont & Co., who after running it a short time dismantled it and removed the machinery to their mill in Louisville.

In the winter of 1832-3 a flour mill at Mayville was changed into a paper mill, having an equipment of two engines and a cylinder machine. It was operated for about two years and then changed back into a grist mill.

About 17 miles south of Lexington, Jessamine County, Kentucky, the Messrs. Warnack built and operated a two-vat mill.

* Thomas Willcox, a nephew of Mark Willcox, owned a paper mill on Ridley Creek, near the present borough of Media, which he sold in February, 1784.

Byron Weston Company
MAKERS OF
LINEN LEDGER AND RECORD PAPER
MILLS AT DALTON, MASS., U.S.A.

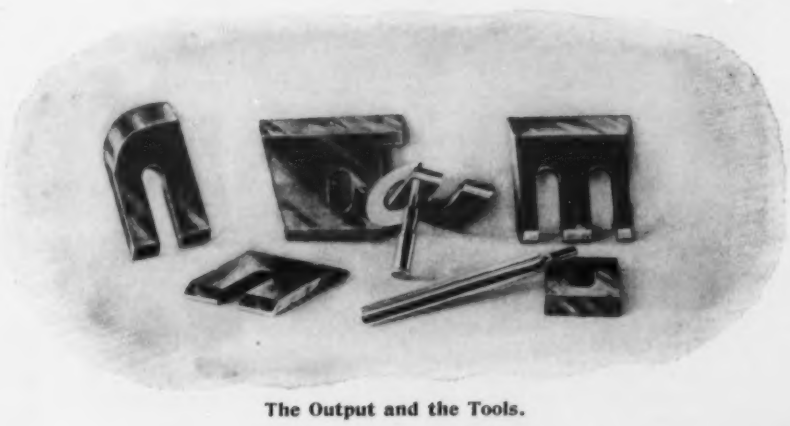
ESTABLISHED IN 1830.

THE STANDARD OF COMPARISON.

"Micro-Ground" KNIVES

For ALL USES.

Loring Coes



The Output and the Tools.

"PYRO-CALCIC" TEMPER

Paper and Stop Cutter Knives,
Bark and Chipper Knives,
Etc., Etc., Etc.

LORING COES & COMPANY,

WORCESTER, MASS., U. S. A.

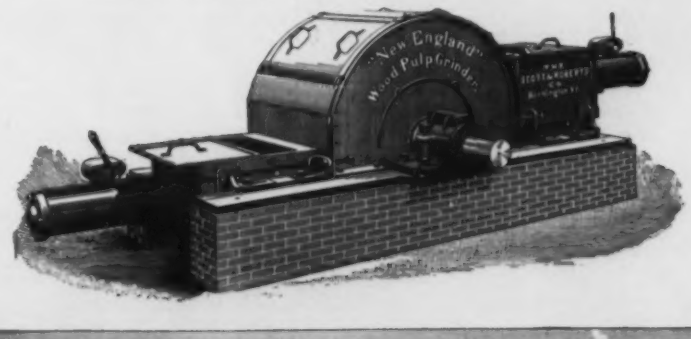
All mentioning this ad. will receive SOUVENIR and special service.

PULP GRINDERS ARE SUBJECT TO THAT LAW OF EVOLUTION,

"THE SURVIVAL OF THE FITTEST."

THIS cut illustrates The New England Grinder as first made and put on the market in the spring of 1888, fitted to use stone 48 inches diameter, 26 inches thick, to grind wood 24 inches long, having two pockets, one on each side of the stone, placed as low under the stone as practicable, and designed to use from 100 to 125 horse power. This arrangement of the pockets causes the stone to be partially lifted off its bearings when the feed pressure is applied, thereby reducing the loss of power by friction about 8 horse, whereas pockets placed on top of the stone in the usual way increase the friction from 4 to 6 horse power each, as shown by actual tests. Of these machines about 200 were sold, most of which are in use to-day, and have never been excelled in quantity or quality of pulp made, in proportion to the power used. The same machine was also made to use stone 18 inches thick, to grind wood 16 inches long. A third pocket placed on top of the stone was afterward added, so that the machine could be used as a regular three-pocket machine, all parts being made heavier and stronger and adapted to use 250 horse power, thus increasing the capacity of the machine; the hydraulic cylinders being at the same time made larger. Next, an adaptation of pipes and valves was added, so arranged that the three pockets might be used independently, as is usually done on a three-pocket machine; or, by closing a valve, the lower horizontal pockets could be used as a two-pocket machine and the top pocket used as a regulator of speed, the valves and pipes being so constructed that whenever the feed pressure was thrown off from either horizontal pocket the same pressure was turned into the cylinder of the top pocket, thus bringing the top pocket into action during the time the horizontal pocket was backed off to be filled, and when the pressure was again turned on to the horizontal pocket it was cut off from the top pocket; the arrangement being such that when the feed pressure was transferred from one pocket to another the second pocket was always brought into action before the first pocket was released, thus insuring that two pockets should always be at work, a feature possessed by no other pulp grinder. The machine has been modified and improved from time to time, during the past nine years, fourteen times, developing in 1896 into a machine as shown in the cut below, retaining all the desirable features and remedying every known defect.

The machine represented below is now offered on the market, greatly strengthened in all the working parts, to take stone 54 inches diameter, to grind 24-inch wood, weighs 9 tons and embodies the following points: The pockets can be conveniently adjusted and kept within 1-100 of an inch of the stone, SO THAT NO SLIVERS CAN BE MADE. The follower is always moved with the cylinder and works up close to the stone at all times, but cannot touch



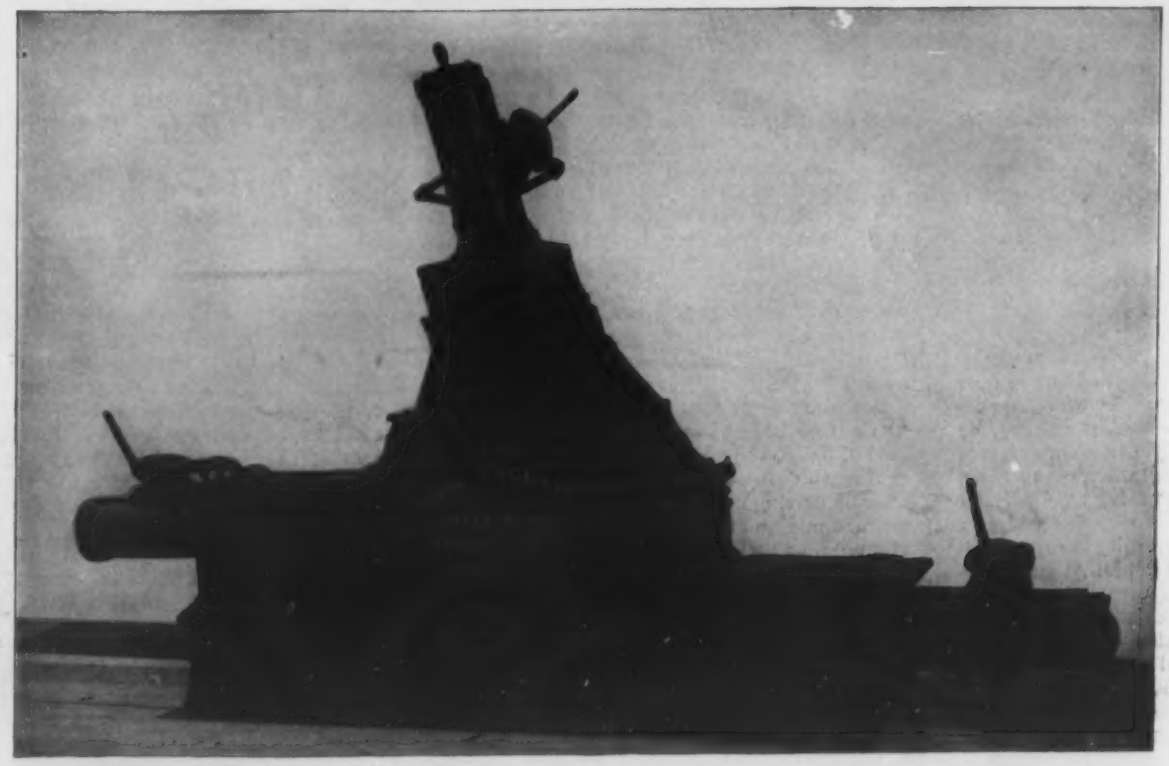
it. Has brass-lined hydraulic cylinders, brass valves and stuffing boxes, steel piston rods, hammered shafts from 6¼ inches to 8½ inches diameter, according to power used, can wear stone down to 40 inches diameter, and can take in wood 13 inches diameter without splitting. Can operate without throwing a drop of water or pulp out of the machine.

Can furnish machines, two-pocket or three-pocket, to grind wood 16 inches, 20 inches, 24 inches, or 28 inches long, at prices ranging from $400.00 to $700.00, using hydraulic cylinders ranging from 8-inch to 16-inch diameter, according to power used.

They are simplest, most conveniently accessible in all parts, most easily and cheaply operated, of any grinder on the market.

The pockets being larger than on any other machine, can use more power and make a greater product.

About 500 of these machines have been built, which are used in about 100 mills, a number greater than that of any other grinder in the world.



As figures are confusing, I make the following offers in plain English:

Will sell a heavy two-pocket grinder for **$550.00,** guaranteed to make **more pulp of good quality with greater economy of power and at less cost** for operating expenses than can be done by any other machine on the market.

Will sell three-pocket machine with the above guaranty, adding a stipulation to make a greater aggregate production, using any power from 100 horse up to the maximum which a pulp grindstone can safely stand.

Will furnish grinders to be run in a competitive test of from 15 to 30 days, with any other grinder on the market, under the above warranty.

Will furnish complete outfit of pulp machinery, all of the best, including grinders, screens, wet machines, hydraulic pump, stuff and water pumps, wood-preparing machinery, log haul, shafting and pulleys, all guaranteed to make 10 tons of air-dry pulp in 24 hours, of spruce wood suitable for good news paper, at a cost not exceeding $2.00 per ton, for $5,000.00, or will furnish outfits for larger mills at prices in proportion.

No Pay Required Until You Get All You Bargain For.

Write for further information. No charge for reliable estimates.

Can make designs, furnish plans and specifications for mills to be located anywhere in the United States or Foreign Countries.

OLIN SCOTT, Bennington, VERMONT.

A FEW REMINISCENCES.

HOW THEY USED TO DO SOME THINGS IN OLD-TIME MILLS.

An Efficient Rag Duster—Fire Dryers—Tub Bleaches—The Tinware Peddler—How a Strike Was Averted—Dealing with "Hoboes" in an Effectual Way—Many Curious Incidents of Years Ago.

By JAMES F. HOBART, M. E.

AFTER a prolonged period of thought and cogitation regarding the very earliest recollections of a paper mill and its machinery, I must concede that the rag duster is the portion of machinery of which I have the very first and most distinct recollection. The circumstance is very vividly impressed upon my mind, and I must say that the effects of my first introduction to rag dusting in a paper mill were felt throughout my whole system, and permeated my entire body as well.

It happened as follows: My father was in charge of the repairs of the mill in which the experience was gained, and while I as a small boy was playing around the beater room my father called and sent me for a plug of tobacco. I was to go to his house, a quarter of a mile away, and return as quick as possible. But, alas, play was stronger than duty, and I loitered, then forgot the matter entirely until recalled by a glimpse of the paternal ancestor looking for me.

I hid, but not in time. In desperation a short cut was taken through the mill to the rag and duster room, where I was cornered and caught, and dragged from a hiding place beneath the railroad duster that stood in the room. I had no recollection that the duster was in operation when I was going under it, but it was running fast enough when I came out—or something was, which gave my "rags" the most thorough dusting they ever received, before or since.

The old "fire dryer" was another appliance that was early impressed upon "memory's tablets," and it happened in this manner: A single cylinder mill had one of these big cylinders in operation for drying the paper that slowly—yes, very slowly—rolled off onto the little 48-inch felt. There was a big furnace built inside an iron drum, seemingly 16 or 18 feet in diameter, which was hung on trunnions and revolved about and around the furnace. The paper reached the big drum at the bottom, passed almost entirely around it, and left over another roll near the place of beginning. This was the most economical method of drying paper I have ever seen. About all the heat was put just where it was wanted. Nearly all the heat units from the fuel went into the iron cylinder, and it was not like steam drying, where over 98 per cent. of the heat is lost when the paper maker lets steam blow through the dryers.

Figure it out for yourself. Steam goes into the dryers at 40 pounds' gauge pressure, each pound containing about 1,169 heat units. It blows out at atmospheric pressure (212°), containing about 1,146 heat units. The amount of heat, 23 units, remaining in the dryers goes to dry the paper—a little less than 2 per cent. of all the heat that goes into the dryers!

When the machine tender does as he ought to do, and condenses the steam in the dryer, then he is doing better. In addition to the 23 units, he gets the benefit of the latent heat which is given off when steam is condensed, and the 966 units thus obtained, added to the 23 derived from the live steam, gives 989 units out of 1,169 supplied, a utility of about 85 per cent., which is pretty good, but is subject to further loss, as the steam comes out partially, instead of wholly, condensed. This shows how necessary it is that no live steam escapes from the dryers.

But to return to the old fire dryer. The mill only ran daytimes; so the furnace would be cleaned out nicely after the mill shut down at night, and the ashes and dirt removed, and a fire laid for the next day. Just imagine a furnace with ashes and cinders in the middle of a modern paper machine, with the dust flying at will all over the paper from cylinder to cutter! What a howl there would be nowadays over paper thus treated!

The furnace, nicely cleaned out and lined with a bed of soft shavings, used to present to the genus "hobo" the most inductive attractions as a bed on a cold winter's night, and the machine tender, as he ran down to the mill and touched off the fire in the dryer before breakfast, nearly always had to try conclusions with one or two of the tramps, who objected to rising so early in the morning.

On one or two occasions the hose was turned on them, and they came out forthwith, but that spoiled the fire, and the furnace had to be cleaned of all the wet shavings and kindling before the fire could be started. It came to such a pass that the machine tender used to carry with him in a can some bunches of tow, saturated with camphene—the burning fluid of the day, which was before kerosene and naphtha were known. A peremptory invitation for the tramps to "come out of that, be jabers," followed by the speedy introduction of two or three of the lighted fire-balls, brought them out instanter every time. It was one of the most literal examples of "firing tramps" that I ever saw or heard of.

It is a by-word among the paper-mill fraternity that as a mill rots out every seven years and has to be rebuilt, that a mill-owner would make his fortune in the business if it were not for repairs and renewals. In contrast with this, let me state the case of a certain water-wheel shaft made somewhere in 1840 to 1845. It was an oak shaft, and the wheel was one of the old tub variety, driving four beating engines, geared direct to a large mortise gear on top of the shaft. And, by the way, when that shaft and wheel were taken out, there was almost room enough for another mill in the space they used to occupy.

The shaft was taken out in 1867 or 1868, and thrown on the ground for a year or two. Then it was put under cover, having been cut into sections, and split into quarters. In 1874-5 the pieces of shaft were split and shaved, and worked into the wheels and gear for a road wagon, and after doing duty for fifteen years under the writer's personal observation this wagon still saw occasional service, and to-day is, to the best of my knowledge and belief, in condition to go anywhere upon the roads of Massachusetts, where it now is. Score for a part of a mill that did not rot out in seven years or seven times seven!

The wooden shaft above described brings vividly to mind the methods employed in making rolls for beaters and washers before the day of the cast-iron heads now employed. Then a new roll used to mean a trip to the woods, up hill and down, and a searching for an oak tree the trunk of which was large enough to form one or more rolls. It then used to be a part of a millwright's business to keep well posted regarding the material available both for rolls and water-wheel shafts, and also for cogs for the large mortise gears then employed.

To this end a good deal of Sunday roving in the woods had to be done, and when the "paper-mill owner was not perverting the morals of the millwright, by making him work all day in the mill, that functionary had to be breaking the Sabbath by roaming the woods in search of timber." Did you ever hear advanced before that idea of how millwrights and other mill men became habitually such poor church attendants? Wonder how much truth there is in it?

But a log having been found suitable for a roll it was cut in the spring or fall and rolled into the nearest pond, to lie there and soak out its sap until wanted. A beater roll showing signs of giving out one day in the middle of winter, the millwright with a team and several sons of Erin set out for a pond 3 miles distant to fish out a log for a new roll.

After breaking a road through the deep snow, and cutting a hole through 2 feet of solid ice, the log was finally grappled, and the tug of war, of getting it on the ice, began in earnest. The ice was wet and slippery, and the log was wet, slimy and more than slippery, so much so that when one of the Irishmen attempted to lay hold of it and help roll it out of the hole his hand slipped, likewise his foot, the log and all the levers; and both man and log took another short trip completely under water, much to the delight of those "not in it."

But the work of making that roll! The rough hewing, and the mortising of the hole for the shaft! And then the fitting and wedging of the shaft, and the turning of the channels for the rings at each end of the roll. But the turning of the roll itself, mounted on blocking, with a big crank on the end of the shaft, and as many Irishmen on the crank as could get hold of it! That work will never be forgotten by one who has been there.

And then the sawing of the grooves for the bars or knives. That *was* a job. An old up-and-down mill-saw, with handles at each end, constituted the instrument of torture. A stick nailed on the roll lengthwise formed the guide for the saw, and after marking a dozen grooves, what fun it was to pick out the biggest man in the crowd of laborers around the mill and give him the business end of the saw—it only cut one way in splitting the slot for the knives—and then after putting the smallest runt of a man that could be found on the other end of the saw, stand by and see the big fellow work until he was tuckered, and hear him reel off the brogue at the little chap, who never turned a hair. Sport? Well, some!

The tub bleaches they used to put on, and the perspiration it used to cause to "throw them off." Stripped to the waist, Pat would jump into a bleach and throw out rags in a cloud of steam which hid him from view, but did not hide all his lurid remarks concerning the similarity between that particular bleach and a certain "purgatory" mentioned frequently in his conversation. "Faith, thin," he remarked, "if purgatory is afther bein' loike thot, it's another dollar mesilf 'll be afther givin' to Father O'Reily the Sunday week." And he did.

But why was that little Turkish bath arrangement so ruthlessly spoiled by a remorseless millwright, who arranged the bleaches in a semicircle, and built a car track among them? Then he rigged a crane to stand in the centre of the circle so it would command all the bleach tubs. A false bottom in each tub had chains permanently attached, and that chap would just swing the crane around, hitch on the chains, and out would come a whole bleach of rags, and land right on a car on that track, over which it would be pushed right into the storeroom close to the washers.

But the occasional day on which the tin peddler drew up in front of the machine-room door, with his red and yellow Noah's ark. That *was* a day, no mistake, at the country mill back in the woods before the day of the telephone or the country weekly—or of wood pulp. What a load of gossip the old chap used to bring, and how the entire force of the machine and cutter rooms used to drop work and collect around the old chap as he bought the old wire, and traded it out in dustpans for the screen, petticoat lamps for the mill, and a lantern or two.

That rascal always had a fake watch or two, with which he would beat somebody in trade, no matter if they had both eyes open, and mouth too, with wisdom teeth fully cut. His jewelry! If that man had stayed in town for a year the rings and pins would keep bright and wear well, but the very next day after the old cart had squeaked over the line into the next town, those rings and "fixins" would show up pure, unadulterated brass. And do it every time!

But when wood pulp became a fixture at the mill, the peddler's face began to lengthen. One day I well remember a load of pulp had just been dumped off the team in front of the mill when the peddler drove up and managed to tip his cart over by driving against the pile of pulp. For a time there was a grand mix-up of tins, pulp and profanity. Finally things were righted up a little, and the peddler began to sort out hair pins and knives and forks from among his tin pans and oil cans. "To —— with wood pulp," ejaculated the peddler.

"That works both ways," said the "old man." "The peddler says: 'To —— with wood pulp,' and the wood pulp says 'to —— with the peddler,' and I reckon the wood pulp will come out top of the heap in the long run." If the rag peddler didn't go there he went somewhere else, for he has disappeared from the face of the earth, and wood pulp is to blame for it.

It was a cute scheme that the "old man" put up to get his rags sorted, wasn't it? Never heard the facts? Well, 'twas this way: An order came in for a lot of paper in a hurry, and there were no rags in stock that had been sorted which would do for that order. The rag pickers were working by the hundred, and were a pretty disgruntled set, the pay not having been as high or as regular as they liked. But this big order came in, and there was plenty of cash behind it, and those rags had to be sorted pretty quick. The day the stock arrived at the mill the attempt was made to hire extra rag-room help, but girls were scarce just then, and not one could be found.

The regular gang thought it a good time to settle old scores, and a few new ones, so they got to talking strike, and more pay, and all that sort of stuff. They were to have a meeting the next evening to settle the time of the strike, when that afternoon one of the girls found a $1 bill in the pocket of an old vest. The next morning another girl found a $2 bill, and just before quitting time on the evening of the strike—that was to be—another girl pulled out a $5 gold piece from a wad of rags she was sorting.

That settled it. Everybody wanted to work overtime, and the "old man" obligingly let them do it. Two $1 bills were found the next day, and one on each succeeding day for a week. By that time the extra work was well caught up with, and although the new lot of rags lasted for nearly six weeks afterward not another bit of money was ever found in them.

"Pretty good investment," the "old man" was heard to mutter some time afterward. "That extra work cast me just $16, and it saved hiring new help temporarily, prevented a strike, and got the order sorted away ahead of time. Pretty good investment—pretty good!"

Some queer things happen in the boiler room as well as in the machine room of a mill. Among them I recollect the case of a man of Irish descent who had in charge the boilers of the mill. For many years this faithful man had kept things just right in the boiler room for twelve hours a day and seven days in the week.

But one Monday morning the steam was down, the pump running had filled the bleaches solid full of water—the boilers ditto. Larry (who, by the way, could play the bagpipes excellently) was with great difficulty aroused from a sound slumber, and when brought to a realization of his offense, immediately and with great dignity, produced a bottle containing a very little—*milk*, and gravely informed the "old man" that he (Larry) had unwittingly taken too much the night before; too much *milk*. As the man was a trusted one, whose record had always been excellent, nothing more was ever said about the affair, and it never happened again, but among the boys! it was years before the last was heard of Larry's *milk drunk*.

Another man in the same business, but who was somewhat apt to lose his head in case of trouble, came tearing into my house one morning before breakfast and delivered himself thusly: "Mr. Hobart! Mr. Hobart! Will yees be afther goin' down to the mill in a big hurry an' see what's the matter wid the donkey pump? The divil a bit will it be afther goin' at all, at all for the loikes av me, an' its meself phwats got ivery valve around her wide open."

I went, and found that he had correctly stated the cause of getting no water into the boiler. The network of valves and piping around the pump provided many a by path for the water instead of providing a direct passage into the boiler.

Another case of trouble in earnest was where oil was burned under the boilers of a paper mill, the Archer system of making producer gas being in use. One morning the fireman was starting up a cold boiler and he placed his torch in the furnace, stepped to the valve and turned on the gas, but it did not ignite. He looked in and found that the torch had fallen down and become extinguished.

Instead of shutting off the gas and waiting until the furnace had cleared itself, the fireman relit the torch and poked it into the furnace again. It lit the gas that time, and by the time I had covered the 200 feet between me and the boilers, he had picked himself up and was looking to see what had become of his hair, beard and eyebrows. He had been blown about 20 feet by the explosion, but was not much hurt, and was at work again in a week, after new skin had grown on his nose and cheek bones.

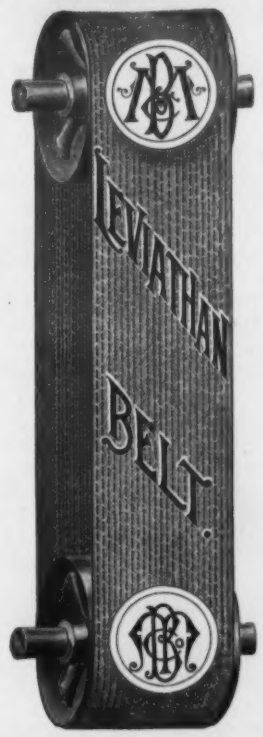
But that boiler setting! You should have seen it. Every single brick seemed to be standing right up on end. On going up top of the boiler and looking at the eruption there, I could only think of a lot of oats that had traveled some distance in a barrel on a cart. Well, all those bricks were standing on end just about like the oats in the barrel. It is said that there is always something good to be found in every accident, or in every evil. After looking this matter all over, and thinking of it for several years, I have found the good. It is this: *Those bricks cleaned very easily!*

Of flood and fire many an incident is engraven on memory's tablets, and a single one I must transcribe "for the flood of good things in THE JOURNAL." The river, rising dangerously high one spring, threatened to carry away the head-gates and bulkhead, therefore a couple of teams were set to hauling big boulders, and all hands from the shop were detailed to roll the stones upon the threatened woodwork.

Many of the villagers had assembled to watch matters, and the river bank was lined with ladies and children. One of the shop hands, whom I will designate as Frank J——, was doing more talking with the ladies than he was of rolling rocks, but in response to a call from a mate who was tugging at an enormous boulder, Frank, who was, and is, very short and stout, turned his back upon the fair ones, bent low to the work, placed his shoulder to the rock and heaved with all his strength. The strain was too much. Frank's trousers split open from front to back. The poor fellow straightened up, cast an agonized look around, and fled hastily to the shop!

The values of the rags imported into the United States up to 1872, the year when THE JOURNAL was first issued, are as follows: 1838, $465,468; 1839, $588,318; 1840, $564,580; 1841, $496,227; 1842, $468,230; 1843, $79,853; 1844, $295,586; 1845, $421,080; 1846, $385,387; 1847, $304,216; 1848, $626,617; 1849, $524,755; 1850, $748,707; 1851, $903,747; 1852, $626,729; 1853, $982,837; 1854, $1,010,443; 1855, $1,235,151; 1857, $1,448,125; 1859, $1,376,771; 1860, $1,540,244; 1861, $1,130,512; 1862, $263,014; 1863, $1,316,723; 1864, $1,046,641; 1865, $1,024,712; 1866, $2,437,009; 1867, $2,829,674; 1868, $1,961,707; 1869, $2,800,619; 1870, $3,139,024; 1871, $3,837,466; 1872, New York alone, $4,037,115.

LEVIATHAN BELTING



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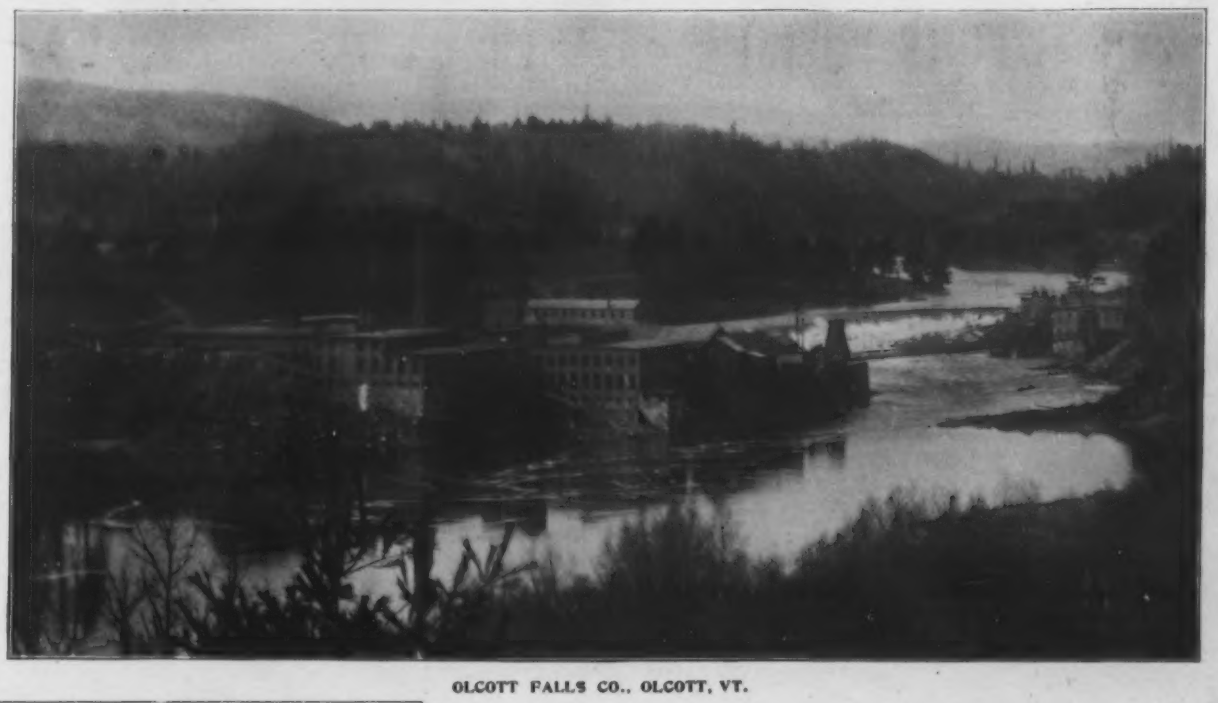

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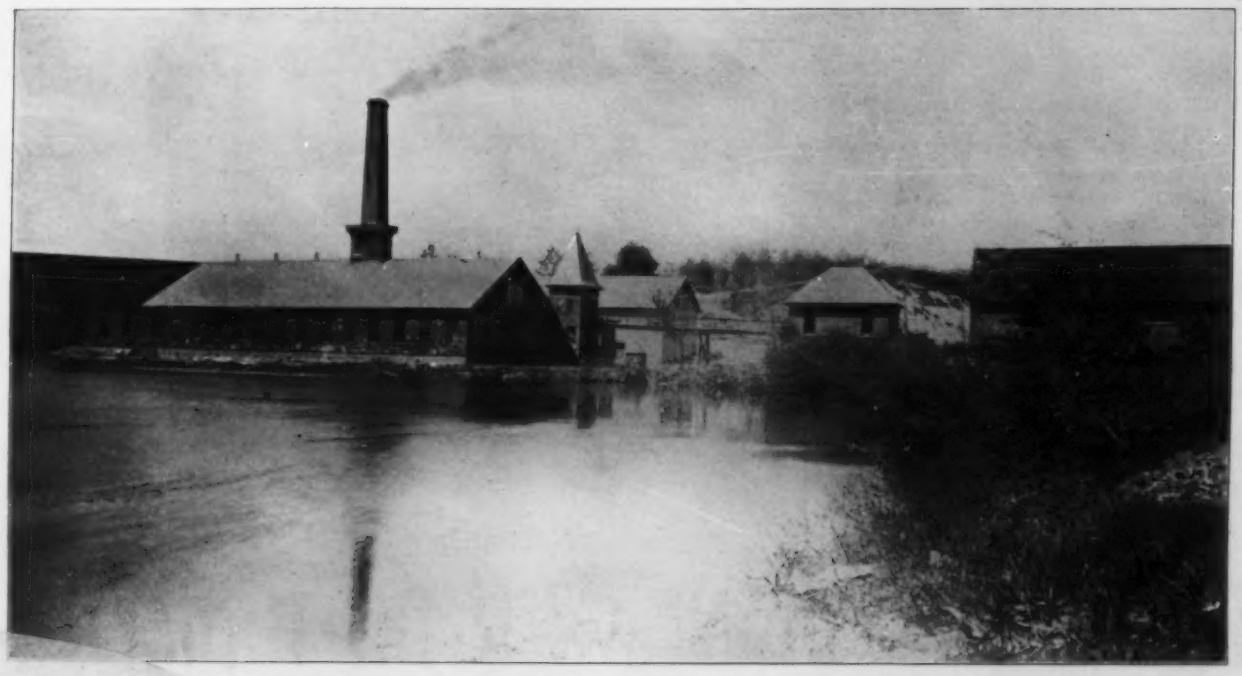

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THE STEADILY GROWING CALL FROM ABROAD FOR AMERICAN PAPER.

Home Market Preferable—Increase in Capacity of Mills—Increase in Population—Our Export Business Not a Temporary Expedient—Requirements of Foreign Trade—Methods of Packing, Terms, Etc.

By W. H. PARSONS, Jr.

IN these days of depression and over-supply, which happily shows some signs of vanishing, the exportation of paper has assumed an importance which it has never before had. As a nation it has been the custom to turn to our millions of thrifty people and satisfy ourselves that we had within our own borders the best customers in the world. It is still true that a home market is in some respects the best market a manufacturer can have, but when the home market will not absorb

W. H. Parsons, Jr.

the manufactured product he is forced to look for a wider market to the other countries of the world. That this has been and still is the condition of the paper trade no one will deny.

The increase in the capacity of paper mills in 1890 over 1881 was, according to Lockwood's report, about 91 per cent., and in 1895 over 1890 about 55 per cent., whereas the increase of population of the United States was in 1890 over 1880 about 25 per cent., and we may perhaps assume, for the sake of argument, that the increase in 1895 over 1890 was about the same; that is to say, the increase of paper-mill capacity in the last fifteen years has been more than double, and probably fully treble, the increase of population of our country during the same period. Doubtless the home demand per capita has increased, but that it has not increased as rapidly as paper-mill capacity has increased is proved by the large exports and the considerable number of machines not in actual operation.

The fact that we have an export trade is the best proof that we need a larger market than our own country. Nor is the present large export of paper a mere temporary expedient. As home consumption increases the exports may be reduced, but new machines will be built to carry on the battle which has begun, a peaceable battle which is to place American paper in every part of the world. "Necessity is the mother of invention." This country has always shown marked inventiveness, but the ability to compete successfully in the paper market of the world is not so much due to mechanical as to natural resources. We have unrivaled water powers, great forests, unsurpassed machinery, and these three qualifications, coupled with energy and knowledge of the requirements of the foreign market, must win the battle for us.

American paper machines are probably known the world over, as is shown by the introduction of them in Great Britain, Japan and elsewhere. We make more paper by fast running of machines, and it is safe to say that the cost per pound for labor in the paper mills of the United States is little, if any, more than in the mills of the Old World. For the establishment of our foreign trade more knowledge is needed of the usages of foreign countries, with which we must in some degree comply, and a greater willingness to conform to these usages. There is also great need of improved facilities for banking and of steamer communications.

It was recently said by a prominent South American importer: "You Americans are not merchants. The French and German exporter gives time—three, four and six months. You expect for your foreign shipments cash against discount." A large part of our domestic business is done on credit. We cannot reasonably expect all our foreign trade to be done on a cash basis. There are honest men in all quarters of the globe.

Beside the written terms we need to consider the methods of packing required by our foreign customers. Very often it has been the experience of manufacturers that the goods they have sent abroad have, in point of quality, been perfectly satisfactory, but they have not been packed in accordance with the foreign requirements, and have therefore been thoroughly unsatisfactory. Business which, with more knowledge and care, might have been secured has been lost, and in such a way as to be much harder to regain than if it had never been attempted. The story is told of a South American order which was placed in this country on the condition that in the packing, as in every other respect, it should duplicate a previous lot which had been very satisfactory. The original lot had been in bales with boards top and bottom, as is customary. These boards found a use in the foreign country which was not contemplated by the paper manufacturer. He attempted to improve on the packing of the original, and sent out the duplicate lot without the boards, but, as he thought, in superior bundles. The result was annoyance on the part of the customer and loss of business to the manufacturer.

One of the most difficult things for Americans is to forego independence of action and obedience to orders, but this is a *sine qua non* of satisfactory business with foreign countries. In our domestic business we can take some chances, but not when we are dealing with customers thousands of miles away. Foreign trade is to be had by deliberate, well-planned efforts. A low price is by no means the only thing necessary to secure business. The battle must be one of thought and plan and not of spasmodic efforts. The exporting of paper to any considerable extent is a comparatively recent thing. With England, Germany, and the older countries it is very different.

From the Bureau of Foreign Commerce at Washington the following facts have been secured: In 1890 the exports of paper from the United States were $1,222,686; from the United Kingdom, $8,170,833; from Germany, $13,685,476. In 1895 the exports were from the United States, $2,185,257; from the United Kingdom, $7,059.442; from Germany (1894) $13,197,576. It will thus be seen that the exports from the United Kingdom have shown some diminution, while the exports from the United States have shown an increase. No doubt the figures for 1896 would show a much greater increase. It is, however, apparent that our own country is yet far behind those other countries, although it is quite safe to predict that within the next five years we shall take a leading place among the nations in the export of paper. This position must be obtained by gradual steps. Our papers are favorably regarded, and in point of quality are acceptable to our foreign customers. It remains for us, in order to successfully build up our foreign trade, to bring our goods to the attention of the buyers, to furnish them as they are required, and in this and other ways to show consideration for buyers' wishes and for the success of their countries.

Munsell, in his "Paper and Paper Making," says under date of 1789: "The paper mill nearest to Albany was at Bennington, Vt., which depended for stock upon the cast-off clothes of the children of the wilderness. Paper was frequently brought from the mill in Springfield on horseback, and, coarse and unbleached as it appears besides the poorest paper of our day, was of such value that it was customary to repair with paste the broken quires which always came with hand-made paper, so that no sheets were lost. There are several copies of the *Albany Register* preserved in a volume in the Albany Institute, which have undergone this process and are so ingeniously done as not to be detected, unless held up to the light." In the present day we seem to have swung clear to the other extreme, and paper is now so cheap and so plentiful that it is wasted at a rate which would administer a severe shock to the people of the early days could they witness it.

Site of the Rittenhouse Mill.

THE RITTENHOUSE MILL.

A DESCENDANT OF WILLIAM RITTENHOUSE SPEAKS OF IT.

The Old Mill on Paper Mill Run—The Rittenhouse Family and the Accomplishments of its Members—The Importance of Paper—The Rittenhouse Memorial Association—A Suggestion for an Arch.

By A. RITTENHOUSE, M. D.

ALL hail the twenty-fifth or Silver Anniversary of The Paper Trade Journal! We feel thankful for its great success in doing good and being the basis of the diffusion of much knowledge; may its incoming twenty-five or more years meet with greater success than the past. It may also be noticed here that it is the 207th anniversary of the first paper mill built, and paper made in America. It was built on Paper Mill Run, a branch of the Wissahickon Creek, in the

A. Rittenhouse, M. D.

western part of Germantown, now part of Fairmount Park. It was built by Wilhelm Rittenhouse and his sons, the first to land in this country of the name. He leased the tract of land for 999 years, bearing date September 20, 1690, and built the mill which made the first American paper.

I am proud to know that I am a descendant of Wilhelm Rittenhouse. He was a descendant of the royal family of Austria (Maximilian); his ancestors had a title of nobility and a coat-of-arms conferred upon them and their descendants forever by Ferdinand II., and later by Ferdinand III.

He was the first Rittenhouse to emigrate to this country, was the first Mennonite minister and bishop in America, and was great-grandfather of the renowned David Rittenhouse, the great American astronomer, philosopher, mathematician and mechanic, who made the astronomical clock (orrery), surveyors' compass, telescopes and nautical instruments that are yet used on every vessel that sails the high seas.

In remembrance of these historical events the Rittenhouse Memorial Association was organized to establish and gather such knowledge as might be beneficial to the coming generations, one of its objects being to gather scientific knowledge and distribute it for public benefit by establishing a Rittenhouse Universary of Science, suited to the higher class of studies, with a free library and museum, to be dedicated to the memory of Wilhelm Rittenhouse.

Paper is an article we cannot do without; the growth of civilization is brought about by the use of paper. It is the most valuable article we have. It carries the seals of kings, presidents, governors, sheriffs, courts and individual contracts. It contains the treaties between nations, the clearance of all ships on the high seas. It has saved millions of lives.

What would the people do without the postal system, paper currency, etc.?

It is invaluable in its variety of uses, and particularly in the diffusion of knowledge and civilization.

I hope I may arouse the enthusiasm of the paper trade to erect a monument over the old original dam at some future anniversary. Not only would it preserve and keep in remembrance the birthplace of the paper trade, but it would decorate the park and give honor to those that erect it.

An arch about 15 feet span would be sufficient, there being placed on top a miniature paper mill made of paper.

In 1820 the paper makers of Pennsylvania and Delaware, in a petition to Congress for a tariff on paper, stated that in their States there were seventy paper mills with ninety-five vats in operation until the importations after the war, since which the number of vats had been reduced to seventeen.

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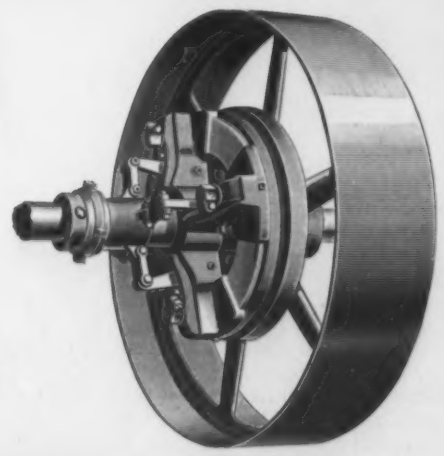

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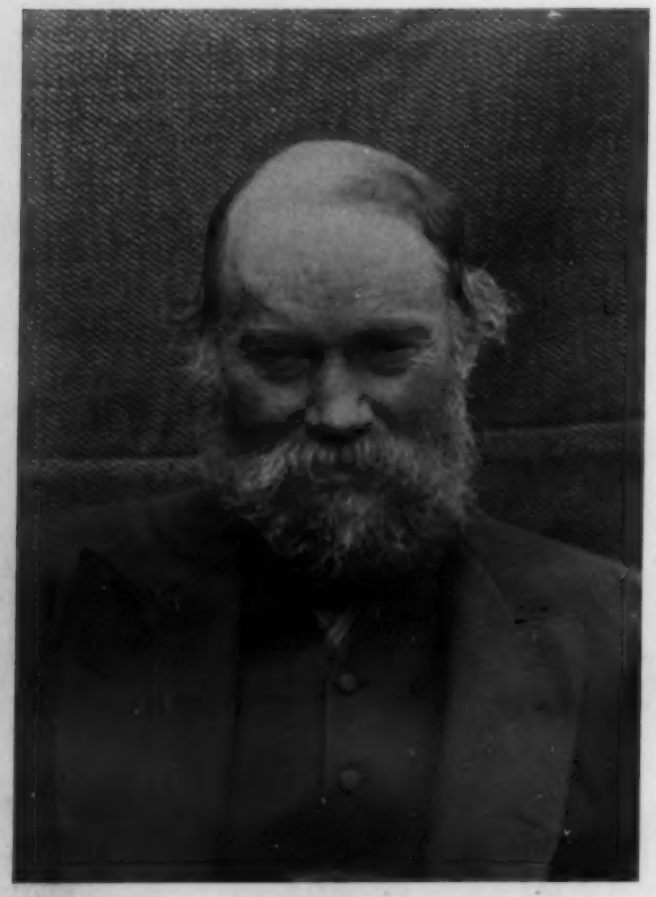
THE STORY OF ITS DISCOVERY TOLD BY THE DISCOVERER.

Result of Experiments on Fats with Sulphurous Acid—Early Efforts to Bring the Process Down to a Commercial Basis—Time and Money Lost—The First Financially Successful Mill in the United States Located at Alpena, Mich.

IN Paris, in 1857, I was making some experiments on fats with sulphurous acid. The solution was made and kept in wooden barrels, and to know the depth of liquid in them small holes were bored a few inches apart, which were closed by removable conical pegs made of soft wood. After some weeks' immersion it was observed that the ends of these pegs, which were constantly wetted with the solution, became soft and fuzzy. No particular attention was paid to this at this time nor for several years after, but on returning to civil pursuits after the war, in 1865, I frequently visited W. W. Harding & Sons' pulp works at Manayunk, near Philadelphia, and recalled to mind the Paris observation.

Some experiments were then tried, and it was found that a solution of sulphurous acid, kept at a high temperature and pressure, would dissolve the intercellular matter of wood, but the fibres left were red colored and hard to bleach. Analysis showed that the sulphurous acid had been partly converted into sulphuric acid, and it seemed probable that the red color came from the secondary action of the latter. The constant presence of an excess of sulphite of lime would prevent the existence of the sulphuric acid, as it would immediately combine with the lime and drive out the weaker sulphurous acid, precipitating neutral sulphate of lime. Experiments confirmed this idea, and pulp was obtained which was pronounced by experts to be suitable for paper making.



BENJAMIN C. TILGHMAN.

In making an apparatus on a practical scale a horizontal rotary cylinder fifty (50) feet long and three (3) feet in diameter was lined with lead and mounted on rollers and heated by inside coils of lead pipe up to sixty (60) pounds pressure. Inside it was divided into a spiral passage its full diameter and length by means of a screw thread made of type metal fastened to its sides, so that as the cylinder slowly rotated the wood chips would keep continually traveling from the end where they were fed in to the end where they were discharged, while the sulphite solution traveled the opposite way and was discharged at the other end. The pulp, nearly free from intercellulose, thus received its final treatment from fresh, strong bisulphite, and was squeezed nearly dry and discharged as a solid cylinder, and the solution of intercellulose in bisulphite was made, just before its escape, to act on fresh chips until its second equivalent of sulphite was nearly exhausted.

It had been hoped that by this means the operation might be made continuous and the temperature of the lead lining might be kept nearly uniform, and that it might thus escape frequent expansion and contraction and might remain tight. This proved to be a mistake. Leaks from cracks in the lead lining kept constantly reappearing, making it necessary, as we then thought, to stop the operation in order to save the apparatus.

It has been discovered within a few years, accidentally, I believe, that bare iron will automatically protect itself from the action of bisulphite of lime by depositing a coherent coating of sulphite of lime, but at that time some artificial protection was considered indispensable. We battled against leaks for many months, until, fairly beaten out, we retired in disgust, having lost $20,000 in money, besides two years' work of my brother and myself. About that time the sand-blast process turned up and we went to work in a new field.

B. C. TILGHMAN.

The claims in Mr. Tilghman's original patent were as follows:

The process of treating vegetable substances which contain fibres with a solution of sulphurous acid in water, either with or without the addition of sulphites or other salts of equivalent chemical properties as above explained, heated in a close vessel, under pressure, to a temperature sufficient to cause it to dissolve the intercellular incrusting or cementing constituents of said vegetable substances, so as to leave the undissolved produce in a fibrous state, suitable for the manufacture of paper, paper pulp, cellulose, or fibres, or for other purposes, according to the nature of the material employed.

I also claim as new articles of manufacture the two products obtained by treating vegetable substances which contain fibres with a solution of sulphurous acid in water, either with or without the addition of sulphites or other salts of equivalent chemical properties as above explained, heated in a close vessel, under pressure, to a temperature sufficient to cause it to dissolve the intercellular or incrusting constituents of said vegetable substances, one of said products being soluble in water and containing the elements of the starchy, gummy and saline constituents of the plants, and the other product being an insoluble fibrous material applicable to the manufacture of paper, cellulose or fibres, or to other purposes, according to the nature of the material employed.

I also claim the use and application in the manufacture of paper, paper pulp, cellulose and fibres of the fibrous material produced by treating vegetable substances which contain fibres with a solution of sulphurous acid in water, either with or without the addition of sulphites or other salts of equivalent chemical properties as above explained, heated in a close vessel, under pressure, to a temperature sufficient to cause it to dissolve the incrusting or intercellular constituents of said vegetable substances.

I also claim the use and application of sulphites or other salts of equivalent chemical properties as above explained, in combination with a solution of sulphurous acid in water, as an agent in treating vegetable substances which contain fibres, when heated therewith in a close vessel under pressure to a temperature sufficient to cause said acid solution to dissolve the intercellular or incrusting constituents of said vegetable substances.

I also claim the recovery and re-use of sulphurous acid and sulphite from the acid liquids which have been digested on the vegetable fibrous substances, by boiling said liquids or neutralizing them with hydrate of lime.

ALPENA SULPHITE MILL.

The First Financially Successful Plant in the United States.

About twelve years ago my attention was first directed to sulphite fibre, not because I was a paper maker or was interested in paper manufacture, but because I was a lumberman and sawmill owner, and as such had for many years been seeking for some means to utilize the refuse or waste from the several sawmills in which I was interested.

August Thilmany had bought the American rights under the Mitscherlich patents for the production of sulphite pulp. Along with several others he proposed incorporating a company at Detroit, Mich., which company was to purchase from him these American rights. It was further proposed and agreed that each incorporator should build a sulphite plant and manufacture sulphite, paying a royalty of $45,000 for a 10-ton plant to the parent company. The latter part of this agreement, although it was subscribed to by each one, was never carried by anyone except myself.

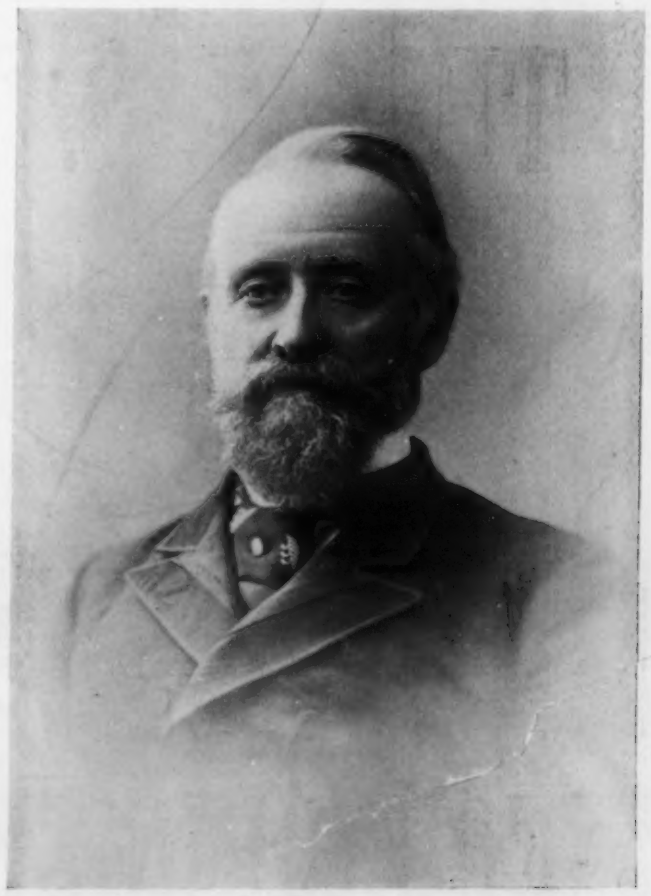
As a result of the investigation of the Mitscherlich patents, and the further fact that they were guaranteed by the inventor against any infringements, the International Sulphite Fibre and Paper Company was formed. The organization purchased the American and Canadian rights for a consideration of $250,000. Five persons contributed in this purchase, and shortly after it was consummated I set about to build a mill at Alpena for the manufacture of sulphite. This was near the sawmill owned by Albert Pack and myself. The sulphite mill was built to a certain extent under the supervision of Mr. Thilmany and others who had never been engaged in mill construction and who proposed to undertake this work at Alpena. The crude appliances used and the imperfect construction were apparent at once to less ambitious men. This resulted in much machinery being replaced and a great part of the construction changed. It also made the plant when completed cost a little over $200,000.

The only part of the plant which did not undergo change was the digesters. These were built after well-matured plans, and under specifications and details submitted by Dr. Mitscherlich. These plans were followed very rigidly. The construction of the type of digester used was simple. Each digester consisted of a large shell or cylinder of iron made of belted pieces bolted together, and resembling, when completed, a huge boiler. The digesters, when in position, were horizontal, and were lined with cement or mortar, in which were bedded special-made acid-proof bricks. These bricks were pointed with cement. Upon one side of this first lining of bricks was spread a second continuous coat of cement or mortar, and in this a second lining of acid-proof bricks pointed with cement was laid. There were manholes for each digester for filling and emptying. Each digester would contain about twenty-five cords of wood cut into discs about 1¼ inches in length, and as the operation of cooking by the Mitscherlich process was slow, from sixty to seventy-two hours were consumed in charging, cooking and emptying each digester.

THE ALPENA MILL—FIRST FINANCIALLY SUCCESSFUL SULPHITE PLANT IN AMERICA.

The pressure of steam used then was about 45 pounds, though a higher pressure has been used since then, enabling manufacturers to shorten the time of cooking very materially, although the fibre by long cooking seemed to some to be decidedly preferable for many purposes.

As time wore on and experience was had, changes were made in the Alpena mill. Cooking of the pulp was improved. The early shipments of the sulphite from the mill were made in canvas bags, which in the course of a short time rotted or were worn out and had to be replaced. The sulphite was not as good as it should have been, and some of it required further reduction through a refining engine, or some such device. The cooking, however, was soon improved and these various difficulties disappeared. Sulphite fibre was then selling at 4½ cents per pound.



GEORGE N. FLETCHER.

When the sulphite mill was completed and running under some of the difficulties named, my partner, Albert Pack, expressed a desire to be relieved of his obligations in the plant, and as he further reflected upon the matter his desire grew stronger. His half interest was thereupon charged to my account and I became sole owner. He has several times since, however, strongly condemned his own judgment of that time, for the plant has paid for itself several times over, and at the present time is yet earning good dividends upon the investment. My interest in sulphite in those early days of its manufacture, and my desire to get all available information to be had, caused me to call frequently upon the late Howard Lockwood, the founder of THE PAPER TRADE JOURNAL. His kindly and friendly advice was always available, and was always appreciated, and I remember his surprise when I stated that the time would come when sulphite would be produced for 1 cent per pound. If he had lived until the present time he might have seen it. It is not done at Alpena, but it may be done elsewhere. Cooking is now being done in from ten to sixteen hours, and 10 tons a day from a digester is not an uncommon output.

GEO. N. FLETCHER.

The Largest Fourdrinier.

On page 13 of this issue will be found an illustration of the smallest paper machine in the world, it being of the cylinder type. On page 76 are two illustrations of the largest machine in the world, it being of the Fourdrinier type. It is 162 inches in width, and was built by the Rice, Barton & Fales Machine and Iron Company for the Rumford Falls Paper Company, Rumford Falls, Me. The felts for this immense machine are 172 inches wide, and were made by the F. Gray Company, of Piqua, Ohio, which had to build a special loom on which to weave them. Through the courtesy of Col. E. H. Haskell, of Boston, THE JOURNAL is in possession of a strip from the first sheet run over the new machine. The strip shows the width of the paper run to be 152 inches. A comparison between the two machines referred to sets one to thinking as to the great strides made by machine builders.

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SODA FIBRE.

A BRIEF STATEMENT AS TO ITS DEVELOPMENT HERE.

The Burgess and Watt Patents—The Preliminary Experiments—The Results Shown in England—The First American Plant at Gray's Ferry—The Rapid Growth of the Industry.

HUGH BURGESS was the father of the manufacture of soda fibre. He was an Englishman, and in 1852, in connection with Charles Watt, he took out an English patent for the reduction of wood to a pulp for paper manufacturing.

The process thus patented was exhibited at small works on the Regent's Canal, London, as were also some specimens of paper made from this soda fibre, as it is now called. The invention was not taken up in England, however, and in the winter of 1853 Mr. Burgess left England, having in his pocket the specifications of his patent prepared and signed. He arrived in New York early in February, and before the 6th of February he had made application for an American patent.

The application was rejected on May 15, 1854. There was a rehearing, and finally, on July 18, 1854, the patent was issued.

As soon as there was a probability that the patent would be granted Burgess procured the necessary apparatus for working his invention experimentally, a part of the equipment being a boiler capable of sustaining considerable pressure for boiling wood in caustic alkali. The apparatus was put in operation in August, and pulp was produced by a single operation of heat and alkali during the summer of 1854.

The apparatus was set up at Gray's Ferry, on the Schuylkill, near Philadelphia, and there the pulp was made and sold regularly to manufacturers, among them being Mr. Warren, at Maylandville, Megargee Brothers and J. Howard Lewis. This experimental plant at Gray's Ferry was continued for five months, until August, 1854.

Larger works were put in operation at Royer's Ford, on the Schuylkill, and they were in operation from 1855 up to a few years ago, when the American Wood Paper Company, which owned the plant, failed. The company also owned a larger plant at Manayunk, which is now the property of the Philadelphia Manufacturing Company, of which Alexander Balfour is president, that company having recently purchased and refitted it as a paper mill.

It is interesting to note just how discoveries are made, and in his testimony in the litigation which arose over the American patents Mr. Burgess, after stating that he began his experiments in the production of pulp from wood in 1851 in connection with Mr. Watt, said:

"My first experiments were carried out on a small scale. At this time I had no laboratory of my own, was limited as to apparatus, and was compelled to work with such apparatus as I could find in my friends' laboratories. Such apparatus as I could not procure in one place I would seek in another. Vessels used for boiling wood in alkalies under and without pressure were of the ordinary experimental kind used in a laboratory, such as small iron boilers, glass flasks and iron enamelled ware. I generated the chlorine and hypochlorous acid in the usual apparatus, making large glass vessels answer the purpose of gasing and bleaching chambers. I worked until I had ascertained the nature of the intercellular tissue of wood, what means would effect its destruction and leave the fibre intact, and also what was the proportion of this fibre. I produced a good pulp by boiling wood in caustic alkali at a high temperature. I found that some woods required much more alkali than others. I found that when intercellular matter was not wholly removed by caustic alkali it could be decomposed by chlorine or the hypochlorites, one answering the purpose as well as the other. I used therefore chlorine or bleach powder, preferably chlorine, since one of the products attending the elimination of chlorine, namely, sulphate of soda, had a marketable value in England.

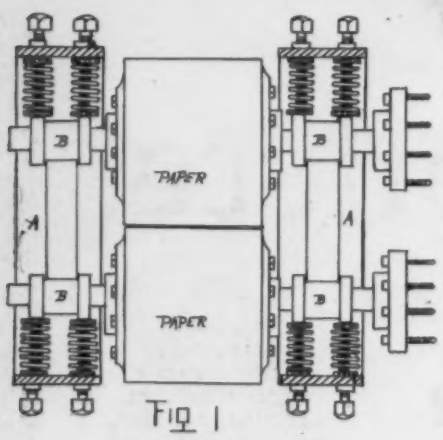

FIG 1

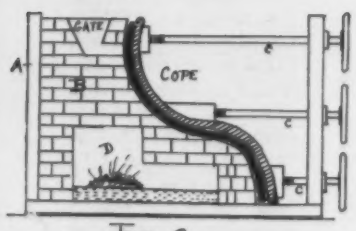

FIG 2

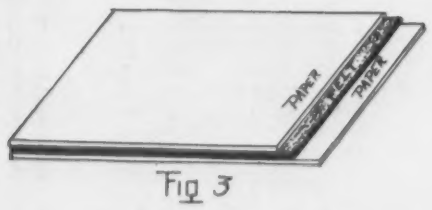

FIG 3

"I found that to a certain extent, and when desirable, I could substitute the employment of caustic alkali for chlorine, the one for the other, but the nature of the wood under treatment materially affected the substitution. As regards the cost, the chlorine process appeared to cost less than the free use of alkali, since one of the products of its elimination is a marketable article in England, and we calculated on the sale of sulphate of soda as one of the sources of profit in working the patent. In drawing up the specification for a patent I therefore laid most stress upon the process that seemed to offer the greatest pecuniary advantage, since the recovery of the soda ash had not been practically tried by us at this time, and we were in uncertainty as to the success of such recovery."

For a long time the American Wood Paper Company was the sole manufacturer in this line, and while it had a sufficiency of litigation in the defence of its patents, it survived and for very many years was one of the leading manufacturers of the country, making both soda fibre and paper. The agent of the company was the late Effingham Embree, father of E. L. Embree, of the Columbian Paper Company, of Buena Vista, Va., and of George H. Embree, the New York agent of the Pennsylvania Salt Company, and to him was due in great measure the large activity of the company. He was a shrewd, intelligent, hard worker, and was always enthusiastic on the subject of the use of soda fibre in the making of fibre. In 1869 the Jessup & Moore Company began to make soda fibre, and now there are a large number of mills engaged in the same line, some of whom consume all they make, while others manufacture not only for their own use but also for the open market. The total capacity for the production of soda fibre is about 1,800 tons per day.

With the increase of mills came overproduction, and prices have gradually declined. For years the chemical-fibre manufacturers had an organization, sometimes under one name and

HUGH BURGESS.

sometimes under another, while with each change of name were some changes as to the management of the association, which was practically a "pool," which controlled production, assigned territory, guaranteed accounts, etc. There is now no such organization. At the time the last "pool" went to pieces there was a large stock of finished product on hand, and the unloading of this caused values to go lower than they ever had gone in the history of the business.

For years there has been a somewhat steady call for American soda fibre from the other side, and a considerable quantity of it has been exported to nearly all the countries of the other hemisphere. While the business is not of large proportions, it is continually growing.

USES FOR PAPER AND PULP.

BY GEORGE DAMON RICE.

PAPER and paper pulp have come into use for many special and peculiar purposes during the past few years. Some of the most important uses, and which have attracted the most attention, are illustrated in the accompanying diagrams. A use which has probably brought paper material into greater prominence in the mechanical line in recent years than many suppose is its adaptation to paper friction wheels. Three points of superiority are claimed for paper friction wheels over metal. The chief is the extraordinary hard, smooth and reliable frictional surface that is developed on the paper face of the wheel, and which makes a most suitable surface for transmitting power. Second, the paper wheels will stand much higher velocity without bursting as a result of centrifugal force, and third, the wheels are lighter.

A hindrance to their use until lately has been means for setting the wheels and keeping them in contact accurately. This is now accomplished as shown in Fig. 1, in which two paper friction wheels are represented in contact. Special bearings *B* are provided, and these are flanged and fitted between uprights *A*. The uprights are provided with caps at top and lower ends, and spiral springs are attached to these as shown. The springs bear upon the wheel bearings and the pressure can be regulated to suit.

Another novel use to which paper material has been put is in boat building.

It is interesting to note that the winning crew in a recent important boat race won in a paper boat, while their rivals, who were apparently as well trained and as able, rowed in cedar boats. Since then several leading paper novelty goods manufacturers have expressed a desire to make paper boats, and one or two have already produced samples. Fig. 2 illustrates, in section, the process of moulding a side for a paper boat, as performed by one manufacturer. A wood case, *A*, is made of plank. The lower portion of the mould *B* is constructed with brick. A cavity is left at *D* for operating a coke fire, by which the mould is heated, after the pulp is poured. The face of the brick is laid up with clay and swept with loam. The cope is wood, and is sustained in position by the rods *C, C, C*. The pouring gate should be located near the middle of the mould, the pulp poured when quite soft, rammed, dried; then the side is removed and the moulded half of the boat compressed, baked, finished off and fitted to its position in the completed boat.

Paper-pulp manufacturers have in the past received occasional inquiries for a light, air-tight boarding material for use in building portable houses for service in low temperatures. The opening of new gold fields in Alaska has augmented this demand, and at present writing a number of manufacturers are getting out samples of light, air-tight boarding like the specimen in Fig. 3. The paper portion is rolled from pulp ground from rags, jute, book stock, etc. The sheets are compressed to an eighth of an inch and two are cemented on either side of common heavy-weight felt. The boards are absolutely air-tight, and appear to be so light that a man might almost carry enough on his back to make a cabin. The joints are lapped and made tight with a cement carried.

While most branches of the textile manufacturing business have been languishing during the past several years, those manufacturers that have been engaged in producing novelties in draperies have done well. This is particularly the case with those making draperies from paper combination yarns, and the paper mills supplying such yarns have made money. Fig. 4 illustrates how these combination paper yarns are made. There are three cylinders *A, A, A*, and the pulp, which is made from either wood or from old paper, is passed into the cylinders through the tunnels *C, C, C*, after which the check valves are closed. Air is then forced into the cylinders from the pipe *B*, and the pulp pressed out into the channel piece *D*, and from this into the numerous miniature glass tubes below. The rolls *E E* draw the fine strands together, after which they are twisted into a thread and used in making draperies. Pulp of different color is used in each cylinder, making a combination thread which is quite novel.

Now that a nickel plating may be successfully deposited upon compressed paper surfaces, cooking utensils, baggage tags, ornamental dishes and many other articles are being made from paper. The articles are moulded from the pulp in flasks, or stamped out. Fig. 5 is a sectional drawing of the plating tank, one side being for the copper deposit and the other for the nickel. The bowls *B* are provided with holes, so that the contents may circulate in the brick apartment. The brick are set up in the wood case *A*. The anodes are marked *C*, positive pole connection with the electric current *D*, and negative pole connection *E*. The articles are wired and placed in the copper solution tank ten or fifteen minutes, then are suspended in the nickel solution tank long enough for a satisfactory deposit to form.

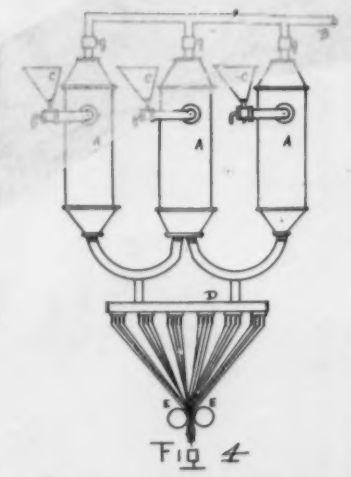

FIG 4

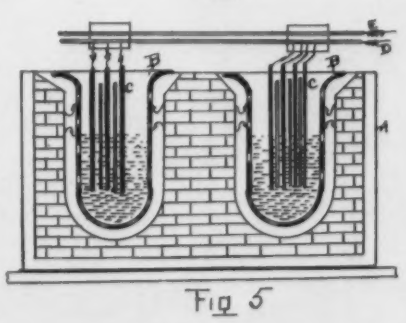

FIG 5

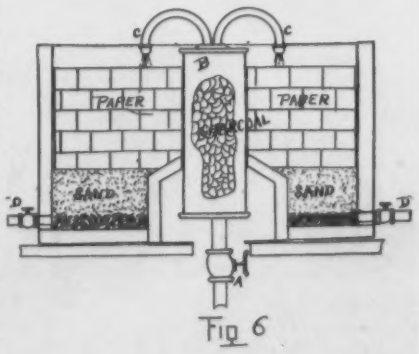

FIG 6

Cubes of porous paper pulp made from almost any stock will absorb certain impurities from water, which impurities may be removed again by simply drying the cubes.

Fig. 6 shows the manner of constructing a purifier of this description. A sheet-iron cylinder *B* is set up as shown and filled with charcoal. The water to be cleansed is admitted to the cylinder through pipe *A*, from which it is forced up and out through pipes *C C*, falling on either side upon the paper cubes. The water soaks through these cubes to the sand, and from there to the gravel base, passing out through the pipes *D D*. Greasy matters, mineral deposits, etc., are absorbed by the cubes of paper, and the combination of charcoal, sand and gravel purifies the water quite thoroughly. And other special uses for paper and paper pulp are constantly coming up. Taking it altogether, the outlook for a large consumption of paper and paper pulp in novelties is very encouraging.

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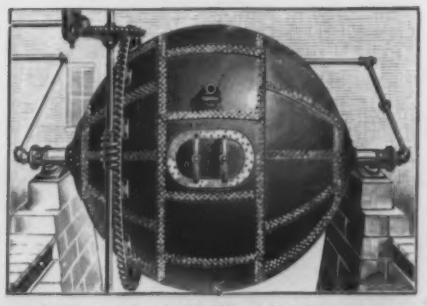

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THE GILPIN MILL.

A PLEASING NARRATIVE OF PAPER MAKING ON THE BRANDYWINE.

Joshua and Thomas Gilpin—Hand-Made Paper—The Cylinder Machine Invented by Thomas Gilpin—A Description of the Mill—The Gilpin Estate—Pleasant Experiences of Visitors to the Mill.

IN 1851 there was published, in Philadelphia, a book entitled "Reminiscences of Wilmington," which was written by Elizabeth Montgomery. The establishment of the publisher was burned out and almost the entire edition of the book was destroyed, so that it is now rare. In that work Miss Montgomery devoted a chapter to the Gilpin paper mills, the facts used in the description of the mills, etc., having been furnished to her by Thomas Gilpin himself. The story was accompanied by a picture of the mill. The book was reprinted in 1872, but the picture did not appear in the second edition. John Sartain, the celebrated American engraver, made the original steel plate of the picture from a painting which Thomas Doughty had painted for Elliott Cresson, but which the artist was obliged to take back in part payment for a portrait. The painting, at the time the plate was made, was owned by Mr. Doughty. In order that our readers may form some conception of the Gilpin plant and its influence, the chapter is herewith reprinted, together with a reproduction of the original plate:

Along the curve of the Brandywine Creek, about two miles above the city of Wilmington, where the stream forms a semicircle for nearly a mile, was situated the estate of Joshua and Thomas Gilpin, at which the water power had been formerly appropriated to the manufacture of flour and various other objects; but on the revival of trade and some of the manufactures immediately after the American Revolutionary War it was converted to the making of paper, which was established there in the year 1787, and continued by the usual process into the commencement of the present century.

In the progress of invention and improvement, however, which has been so remarkably developed in our day, the Messrs. Gilpin extended their concern here very much, and established a new process; it was the art of manufacturing paper by machinery, so as to make a sheet of paper continuous and endless in length, and originating there was the first establishment of this kind in America.

The paper was made on a revolving cylinder, all the machinery for which was made on the spot, and it was entirely successful. It was a novel accomplishment of skill and talent, and was very much admired as forming so very important an improvement, the previous and old method having been to make paper by single sheets by a tedious and laborious process of the workmen by hand labor.

The machinery, requiring great accuracy in its construction, was in process for some time, but was put into use in August, 1817, and about the end of the year began to furnish paper for market; first for the *American Daily Advertiser* at Philadelphia, and for other newspapers, and soon after for elegant editions of extensive works, and for writing. In May, 1821, Lavoisne's great Atlas, in letterpress and colored copper-plate engravings, was published, upon this machine paper, by Mathew Carey & Son, of Philadelphia, and this is noted by them in their edition of the work.

The establishment of this machinery necessarily created great jealousy and envy, for it was calculated to alter, as it soon did after, the whole system of paper manufacture through the country, and it eventually furnished to the American public the means of a greater and cheaper supply of this prime material for the extension of knowledge and literature, and which could not otherwise have been obtained for the extensive demands of our wonderfully extended country.

But the establishment underwent difficulties and disappointments commensurate with its importance.

A patent for the invention had been taken out in the year 1816 by Thomas Gilpin, but this was done before it was perfected and in use, and after it was completed its importance was so obvious that every method was taken to procure a knowledge of it; so that eventually, by obtaining information from time to time of some of the workpeople, and close inspection of the patent, sufficient ideas were obtained of the machine to evade the patent, and similar machinery in rivalship was got up and experimented upon in England; and this was first introduced in the paper mills at Springfield, Mass., where paper by machinery was produced abont the year 1825, and from thence the process was quickly spread through the country.

Besides this, the estate sustained calamities of various character. On the 22d of February, 1822, an overwhelming flood extended over all this part of the country, and by it the creek rose to the height of more than 20 feet, which caused the destruction or ruin of most of the establishments, and on this estate carried away to a great extent the dam, the races, machinery, and some of the buildings. In addition to this, in the month of April, one of the principal mills, with the machinery in it, was destroyed by fire.

These extensive calamities were followed by a further freshet, which took place all over the country in the spring of 1838, by which these works were more extensively injured than by the former one; for being the lowest down on the creek they were more exposed to the flood. The large bridge below them, on the Philadelphia road, was carried away on both occasions. The proprietors of these mills having thus continued the Brandywine manufacture of paper, on the estate, for exactly fifty years, it was discontinued and the estate sold, and the buildings were then appropriated to the manufacture of cotton, which became a more extensive object throughout the country.

The statement of the machine and freshets was handed to the author by Thomas Gilpin, Esq.

It has already been stated that the old mill was in operation before the close of the last century, but it was not so extensively known beyond this vicinity before the improvements, which were made soon after the commencement of the present one; from thence it progressed to great notoriety. Citizens and strangers often resorted to this estate for a pleasant walk and to enjoy its beauteous scenery, as well as to see the novelty and skill of mechanism, visiting the wonder-working machine that could turn out an endless sheet of paper. Paper making is too well known to need a description. Yet as things here were on the most approved plan, and order and neatness presided, we will venture to sketch one apartment in the old mill—a large salle on the lower floor, where more than thirty women were seated on high stools, at a long table placed before the windows, each one having a knife to pick the motes from every sheet, and they were dressed becoming their occupation, with a clean apron as smooth as if an iron had just been rubbed over it. Not a cobweb marred these white walls, nor was dust allowed to soil the floors.

Just above this, a large and modern stone building was occupied in the same way. Many departments of the business were carried on in each of these houses. The stone house below was used for assorting and cutting rags, and another stone structure for extracting colors. In this, immense kettles were fixed in furnaces built of stone that seemed immovable; yet the memorable freshet of 1822 swept the whole of the lower works away, and part of the buildings also. One of these heavy coppers landed on the Pea Patch; and the chain bridge connecting Wilmington and Brandywine was carried down the stream for some distance and landed on the marsh, doing but little injury to the woodwork. Flat boats often conveyed paper on the water from

THE GILPIN MILL, ON THE BRANDYWINE.

one mill to another, but it was generally taken in wagons to the Wilmington wharves. Large quantities of bank-note paper were made here. We have seen whole pieces of new silk handkerchiefs cut to mix with the rags, to designate its manufacture. It is nearly thirty years since the old mill was burnt. The fire took place at noonday and could not be accounted for, but it was on a day when public business was to be transacted, and strangers had assembled. The lighted sheets of paper flew through the air to a great distance, presenting a grand spectacle. The ruins stood for years. Close to the mill was a carriage road. Except this, the foreground was of steep hills, covered with grass and mostly shaded by noble trees. The hills were ascended by steps cut in the earth or boarded and walled up. On the left was a fine clump of trees, and a swing with an armed chair, nicely arranged, where hundreds of youth have whiled away pleasant hours.

"And memories of the loved,
The loved and far away,
Live in those dark and heavy boughs,
And hang upon each spray.

"How can ye, thoughtless winds,
Sing there with so much glee?
My eyes are dimmed with sadness now,
How can I sketch the tree?"

The axe has been laid at the root and the woodman has not spared those trees.

Tier upon tier of stone cottages, yellow-dashed and well ventilated, rise up before you on these hills, shaded by forest trees, each having a yard nicely paled and ornamented with shrubs and vines, climbing to the roofs, mingling taste with comfort.

As a manufacturing district it was long proverbial for the neatness and orderly conduct of its population. One trait in the character so remarkable we must not omit to note. The Messrs. Gilpin were the proprietors, the younger one of whom, Thomas Gilpin, resided partly in Philadelphia, but when here occupied a very pleasant cottage, at which he generally received his friends. His garden was filled with fruit and flowers, with some choice lemon trees in full bearing. There was a greenhouse adjoining, and an icehouse in which the workpeople were allowed to keep their provisions, and to have daily access to it.

He having no family, and having to attend to the business in Philadelphia, passed only a part of his time on this estate, but when absent the house was left to be opened for the use of his friends and such strangers as were brought by them to see the works. Here they stayed, and had the plain refreshments of water, cheese and crackers, "for the string of the latch was never pulled in," yet nothing was ever disturbed, for a corresponding respect was paid by the guests to the attention they were accustomed to receive.

One anecdote to show somewhat the character of some of the parties may be worthy a place in the reader's attention.

In the rosy month of June notice was sent to a party of the young and sportive for the privilege of a day's recreation, and one of the cottages was prepared for them. The owner, passing by a trio of young ladies, when seated in the wood, observed to them that they had a beautiful party, to which one of the young ladies replied: "Yes, and there are three brides among us." The observation he then made was: "Then I hope you are the three." But one of them, with what emotion must not here be betrayed, said: "No, there's no such good luck."

In an elevated and picturesque situation, on the upper part of the lawn, near the top of the hill, but surrounded by a forest grove, stands the very neat cottage of the higher order, built by Joshua Gilpin, Esq., and called Kentmere. It is beautifully situated, with an extensive view over the valley of the Brandywine and the Delaware, with gardens and walks around it tastefully arranged. This mansion is too well known to be further described, where many visitors from the neighborhood and cities have been so hospitably entertained. Mr. Gilpin resided here with his family the latter part of his life, and died there in the year 1841.

In the day of prosperity the large stone house opposite the mill was occupied by Lawrence Greatrake, who managed the concern of paper making. Death summoned him suddenly, in the vigor of life, to leave this extensive business and his large family. A youthful man succeeded him in the management of the establishment for years. It was a beautiful spot and all around it was kept in the neatest order, shaded by trees, shrubbery and vines. Yet no withered leaves or broken branches marred the rich verdure on this hill. The mistress of the mansion, Mrs. G., arranged all within her bounds in good taste.

The court in front was adorned in beauteous order with many flowering shrubs. The balcony in the rear overlooked the creek and mills, and far beyond, and the steep hill descending was covered with rich grass and handsome trees well trimmed, so that the view was not obscured. On one side was the garden, with a serpentine walk the whole length of the entire ground, and planted with different species of trees and shrubbery, consisting of some hundred varieties, completely shaded. Here and there was an arbor, decorated with vines and furnished with stools painted white. This presented the most picturesque view. At the entrance of the estate was a neat cottage, called a lodge, at which the road divided into three ways, with a large gate to each; a private one led to Kentmere, a lower one to the mill below, and the centre one to this house and the mills above.

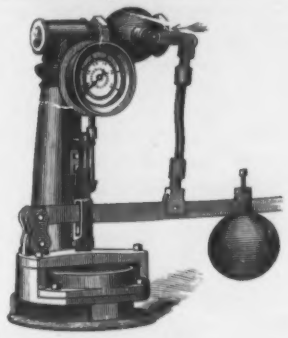
There are many who gratefully remember the civilities tendered to them by this family, especially those caught in rains or thunderstorms in their rambles up these banks, and who sought shelter under their roof. Some far away, who have been educated at Hilles's boarding school, may not forget the memorable evening when the entire school fled to this mansion to seek an asylum from a pelting rain, and the perplexity, as night approached, with no appearance of a change in the weather, and how George Greatrake exhibited his kindness in ordering the large covered mill wagon, geared with four horses, in which fifty or more girls were closely packed like reams of paper, standing erect, secure from the rain. They had a merry ride; though slow, it was sure and novel; a carriage conveyed the teachers home, and this was deemed an event in their life.

The daily crowd of visitors here one would think must be wearisome to master and man, yet all were met by cheerful faces, their curiosity gratified, and questions answered, however frivolous, and the greatest civility extended in passing through the various departments. Some one was ready to show all that you desired to see.

Mr. G. Greatrake, by personal exertion in the freshet of '22, impaired his constitution and became a victim of a disease of the lungs, and in a few years died in the South, whither he went to recruit his health. From his knowledge of the business and popularity with the workmen, his death was a great loss to the establishment. But the business being changed and the estate having fallen into other hands, everything was soon on the wane; and we lament to note the decline and fall of an establishment of which this town could once boast, as unrivaled in its order and pleasant scenery, and the delight and amusement of distant friends in their walk to view the operations at the old paper mill.

How old things have changed! The buildings are now cotton mills with additions. The beautiful trees and tasteful ornaments are laid low in the dust. Like the elder members of this hospitable family, they are mingling with the earth.

We will now pass on to a place of great notoriety, though of more recent growth, and continue to mark things and incidents on our way, as tea parties and picnics often assembled here. We will describe a select one in the words of a departed friend after naming the young persons who had walked up the banks: "We rode to the paper mill, where we alighted, and bore the provisions to the destined place of entertainment. We were soon joined by the company and procured a sylvan retreat just above the mills. The seats on the rocks were arranged in convenient order to receive us, the rocks rising behind to screen us from the world, and affording a rural retreat beside the cold clear stream. The weather was enchanting. The opposite



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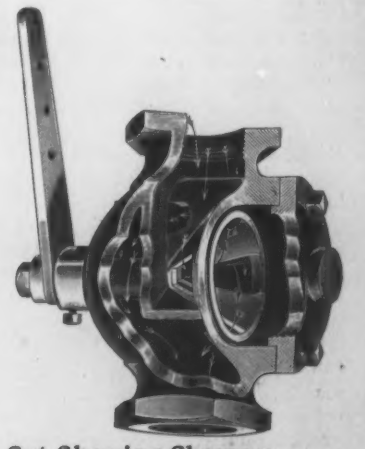

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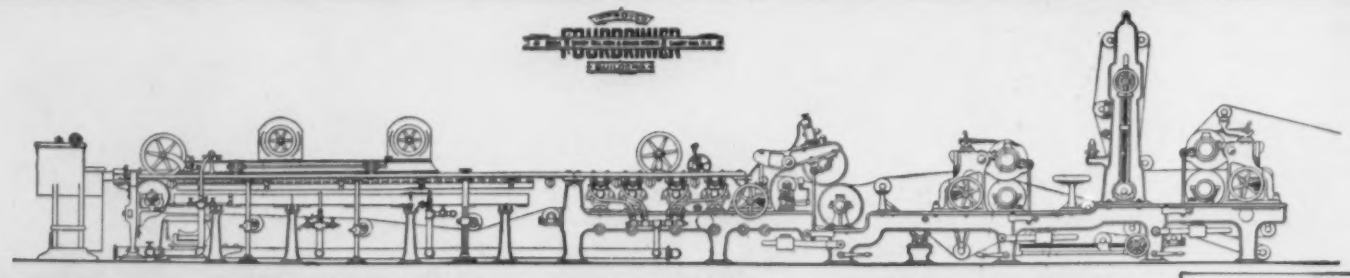

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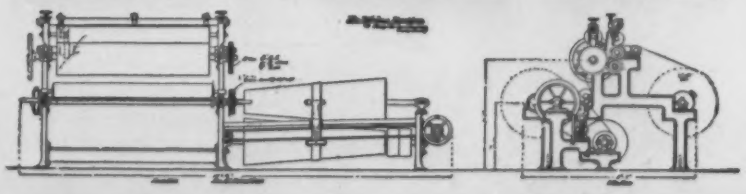

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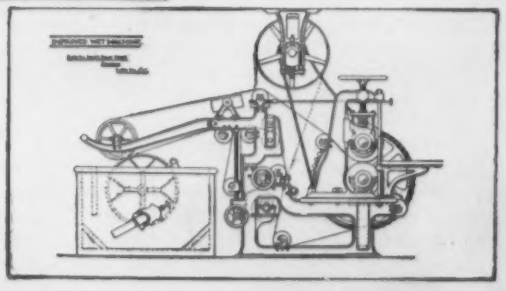

forest was beautifully painted by the finger of reflection on the calm surface of the Brandywine. Every face beamed with youthful pleasure; soon the baskets were opened, and a limpid spring afforded its aid for our gratification. A huge pitcher of cold lemonade was followed by cake, and never before did it more refresh the spirits. The three musicians bounded with elastic step over the rocks, and placed themselves amid a green bower above us. There the flutes played, and the rocks reverberated their sweetest notes. We had a feast of melody.

"A second supply of lemonade and cake was handed round; conversation varied the entertainment; some with hook and line sported on the margin of the stream. The whole scene was picturesque and beautiful. The figures of our musicians, perched on an elevated rock, rendered darker by the rich foliage that nearly surrounded them, formed a fine contrast with the white robes and sylph-like forms of the young ladies, some standing on the green turf, others resting on the rocks, and others again bending over the stream. The sun declined gently and brilliantly, the breeze of evening played upon our faces, and we had a most enchanting walk home.

"I was struck by the romantic beauty of the cottages on the Brandywine, all yellow washed, with white doors, etc., and ornamented in the most tasteful manner with vines and various shrubbery.

"Thanks to the kindness of Mr. Gilpin, our New York guest was perfectly enchanted, and all professed themselves highly delighted. M. and his fair cousin left us at 9, much gratified. The gentlemen dreamed of rocks, cascades and ladies fair. Even I was wandering in dreams over the fairy scene. The waterfall was a fine natural accompaniment to the flutes. We reached home at 8 o'clock, the appointed hour."

Here is a natural curiosity, a flat blue rock of Brandywine, famed for solidity, and high upon it is a flat space, worn by pebbles, so as to leave the distinct shape of an overgrown human foot; that is called the Giant's Rock.

Another flat rock claimed notice in days gone by. A student of Doctor's Way, from South Carolina, who had spent years here and associated with the best society, in September left here to attend the medical lectures in Philadelphia, sincerely regretting his change of home, was induced to make an early visit to the friends he loved. He rambled up these banks with his friend, E. Thomas, Sr., to enjoy the beauteous evening scenery. He observed he was taking his last look of the spot where he had whiled away so many happy hours. They crossed and recrossed streams until wearied, and sat down on a rock musing in sadness that they so soon must part and meet but once more to bid a final farewell.

The doctor had his flute, and played Burns' "Adieu," accompanied by E. T.'s voice, who sang well. While conversing, the Doctor cut his name in the rock ("William H. Kenney, departed.") He left a space for Wilmington, in which E. T. cut "this life, in October, 1794." After his return to the city he was suddenly attacked by a violent fever, and died in a few days, in the same month, much lamented here, and to the great grief of his father, for he was an only son. "But, I said truly, this is a great grief, and I must bear it."

During the speculative mania that raged to an alarming extent from the year 1812 many sober-minded men caught the epidemic, and it seemed to turn their thoughts back to yore, when Blackbeard hid his booty on the border of streams. For by fancied clairvoyance they saw hidden treasure 'neath this barren, rocky spot, and paid $40,000 for a few acres. This was truly scattered to the wind; sowing on rocky ground that yielded no fruit but verified an old proverb that nothing is lost.

The folly that empties one man's purse goes to fill the purse of another. The original proprietor, Job Harvey, was a wealthy and far-sighted man, who gathered in a rich harvest by his speculations.

The next place to note is an old establishment formerly owned by a respectable inhabitant of early days, Vincent Gilpin, who knew Wilmington as a village in its simplicity, and beheld it rise to the glory of a borough; and amid all the changing scenes he sustained his integrity as a worthy man; when full of years he ended life's pilgrimage, leaving to his heirs this property, which was a good old-fashioned house and grist mill. They were sold to Lewis McLane, Esq., more than thirty years ago, who established a cotton manufactory, and called the place Rokeby.

The wire bridge across the stream is near, and also several factories; but Hageley was the oldest building and most improved grounds. For many years it was a summer retreat of Rumford Dawes, a wealthy merchant of Philadelphia, whose family were residents here in village days, incidents of whom, as we proceed, will help to swell our narrative.

Some of our neighboring citizens in fashionable life no doubt yet remember the hospitalities of the owners of this mansion, where they spent weeks enjoying the rural and lovely scenery at Dawes' slitting mill. This was purchased of Mr. Dawes by the Messrs. Dupont for $50,000 to erect powder mills.

In the last century these banks looked like a howling wilderness, studded with rocks, so unfitted for tillage that, apparently, no art of man could change the face of nature. Rattlesnakes and copperheads, it was said, flourished here in countless numbers when Jacob Broome, Esq., in 1795, selected the only eligible spot for a cotton manufactory—the first in this region. It was deemed a wonderful enterprise. Soon after he built a mansion, spacious for that day, on the hill now occupied by Dr. Smith. In the summer of 1797 Mr. Broome's family spent some weeks there; and I remember the spot, when I was on a visit to his daughters.

The mill was not long in operation ere it was burnt down, and remained a heap of ruins.

In the year 1802 we passed a balmy Indian summer in Brandywine Hundred, and my delight was to wander round and through the wood with an elderly female, who loved to tell legends and early recollections of her birthplace and youthful home. Her ancestors were Swedish colonists, one of whom cleared and titled a part of this region, and fitted up his cabin amid the red men, near their wigwam; and by precept and example, convinced them that the white man who walked humbly with his God was their friend and neighbor. Here he was content to dwell and enlarge his borders, improve his grounds and tenements. In old age he set his house in order, trimmed his lamp, and waited for the messenger to guide him to a peaceful home.

The battle of the Brandywine, and many a link in that eventful chain, was bright in the memory of this ancient female. The highway crossed her father's land, and his house was near. On that memorable day he stood at the gate sorrowing over the hard fate of the retreating army, hastening on "faint, yet pursuing."

An officer without a coat, and a bundle on his arm, stepped aside, and piteously asked her to wash a vest. "Most willingly," she said, "but can you wait for it to dry?" On hearing it was drenched with the blood of the slain, as he handed it she trembled, turned pale, and shrunk from the sight.

There was a draw-well at hand, and he implored her to lay it in water, and what she was about, to do quickly, for time was precious. This vest was the only relic of his valued friend, pure patriot and brave soldier, who had fallen on that day by his side, and the sight of it was too grievous to retain longer in that state. His blood-stained garments were sprinkled by the noble fellows who fell on his right and left, while he escaped unscarred. His desire was so intense to preserve his memento, he seized it dripping, and ran, throwing her a silver dollar. She was indignant at the offer of reward. He was gone, and the precious metal was so rare in this region that she laid it aside until peace was proclaimed.

This female, now in her eighty-ninth year, is a remarkable woman. Prosperity and adversity have fallen to her lot; joy and sorrow have been mingled in her cup. She is now alone, The chastening hand of the Almighty removed her worthy husband in the prime of life; having then an only daughter, who was the staff of her declining years. In all this she murmured not, but fell down and worshipped, saying, "The Lord gave, and the Lord hath taken away; blessed be the name of the Lord." Dependent on the bounty of friends, living in an upper chamber, she provides for herself and keeps her room neat and in order. Previously to this year she did plain sewing for the tailors. She goes to market and regularly attends her church and religious duties, contented and cheerful. She feels no want, and says she hath faith to believe that her bread and water are sure, and when her strength fails, the Lord will not forsake her.

Once during the season it was proposed to cross the creek and extend our walk on the opposite side. There seemed no doubt of her finding the boat way. But we were warned of difficulty, and my mother reluctantly yielded her consent to this pedestrian excursion. The sun shone auspiciously on a delightful morning, under a pure cloudless sky. We sallied forth at leisure, admiring the richness of the scenery as we went on. The foliage had changed its verdure into diversified hues, and the whole forest was decked in brilliant colors. Imperceptibly we entered a wild, rugged and almost trackless way, that turned my thoughts to a backwoods scene of a terrific wilderness, where naught was heard save an Indian whoop, or roaring of beasts prowling for prey. Our fears were aroused lest the footstep that put in motion the withered leaves might turn up a nest of rattlesnakes.

Hemmed in by rocks we lost our way. Not knowing whither to go, we began to feel our excursion more romantic than pleasant. We were hedged in, too, by bushes and entangled among briers that clung to our dresses and dragged us back as we scrambled over the rocks, with the twigs flapping our faces and scratching our limbs. There was no way to retreat; we must struggle through and progress slowly with no brighter prospect. My courage was on the wane pretty soon, and now the little stock was gone. We screamed for assistance, but our voices echoed in vain. A nervous tremor seized us—to laugh at one moment, and the next cry in fear.

After passing more than two hours in this predicament, we found that we were descending a steep hill, and soon heard a gurgling sound and caught a glimpse of the stream. We pushed on with renewed vigor to reach the margin, when the sight of a man crossing in a boat cheered our drooping spirits. He ferried us over safe, but could not give us any information, for he was a stranger here.

In loneliness and weariness, we sat down on a mossy rock to rest, and to meditate on our adventurous ramble, "and what will ye do in the end thereof." A broken road was near, and hope buoyed us up that some one might thither direct their steps. We no more desired to try our luck in devious ways; steadily watching, at length we saw the shadow of a carriage, and called to the driver, who obligingly stopped to answer our questions.

The sun was in the meridian, and poured down on the road in extreme heat, so he advised us to pass through the wood carefully. The path was intricate, overgrown with brambles, and a harbor for snakes, and looked as if never trod by footstep; we thought it more tolerable to endure a scorching sun, and preferred the road. This man was Mr. Davis's coachman, who, recognizing me, said he had no immediate duty at home, and could take us the two miles. His civility was gratefully accepted, and we stepped into the carriage with light hearts, and soon arrived at the place of our anticipated visit, rejoicing.

In 1793 William Young, a worthy Scotchman, for years in the book business in Philadelphia, erected a paper mill in this region.

As soon as Mr. Young became interested in this rocky tract, he built a house for public worship in a romantic spot, and it is really a novelty. The floor is a solid rock, and the crevices filled with mortar and the rough places plastered. "It will liken him unto a wise man, who built his house upon a rock." Being eminently pious, he took care to provide a pastor to feed the flock, and guarded well the sheep of his pasture.

A fine mansion was also put up in the last century, and improvements made from year to year, and the numerous cottages soon changed the face of the district. Mr. Young was one of the first directors of the steamboat to ply hence to Philadelphia, but firmly opposed to traveling on the Lord's Day, and during his life it lay at the wharf on Sunday. His place was called Rockland. In the midst of usefulness death summoned him to leave a large family and numerous cares. He, too, was lamented as a public loss.

"Whosoever shall confess me before men, him will I confess also, before my Father who is in heaven."

The old mansion of James Brindley, on this side of the Brandywine, claims our passing notice, because here General Washington took his breakfast on the morning of the battle of Brandywine, walking the floor in deep thought, or standing with his cup of coffee in his hand, eating little, and soon hastening on to Chad's Ford. James Brindley, Jr., who resides here, possesses a valued relic, a lock of General Washington's hair, also a lock of his lady's.

Part of this farm was owned by a Swede, T. Stidham, who lived to a great age the life of a hermit, and for 100 acres of arable land paid the proprietary agent one bushel of wheat yearly, quit rent.

The Stilleys lived to a great age; they were descendants of Swedes. One female of this family regularly attended the old church in her eighty-fourth year, and walked more than three miles. There are many families in this district whose ancestors were Swedish colonists—Hendrickson, Armstrong, Paulson, Springer, etc. Some of those farmers retain much of the ancient simplicity of the fathers, and we add with much pleasure that they are respected by the community for integrity of character and honest dealing. One evidence of similarity between father and son is very strongly depicted by a recent incident. At the close of the year 1849 this parish was visited by a Swedish minister, just eight years from home. This was the Rev. Mr. Unonius, the first Swede who preached here since the Rev. Lawrence Girelius left Wilmington in 1791.

This gentleman's attention was arrested in Trinity Chapel by seeing an old member of the congregation, and a wealthy farmer, walk up the aisle to his pew. Mr. Unonius thought his whole appearance precisely such as he had been accustomed to in his fatherland—dress, manner of laying down his hat, and fixing his whip. Besides, he said his overcoat must have been made in Sweden, for it was their exact pattern for centuries past, and even his collar was fixed as they were worn. He became so excited that he could scarcely retain his seat, and he felt himself indeed among his brethren.

The settlements of the Swedes on the Delaware preceded those of the English by many years, and the emigrants who came were remarkable for an amiable character and an integrity which very much descended to their posterity; there were four churches which were for a long time under the government of the diocese in Sweden, and ministers were appointed from there. The Swedish churches were this Trinity Church at Christiana, and the three old Swedes churches in Pennsylvania—at Philadelphia, at Moyamensing and at the Swedesford on the Schuylkill.

A TENNESSEE VAT MILL.

An Employee Gives an Interesting Description of It.

A one-vat mill was started by the firm of Stump & Brown in 1814, about 25 miles west of Nashville, in Robinson County, Tenn. In 1875 Garrett Wells, an old hand paper maker, who learned his trade in the mill, described the mill as follows:

The building was a log structure of about 30 x 50 feet, of one story, with an attic which was used as a stock and sorting room. In the southeast corner of the building was a rag engine which carried about 125 pounds of stock. On the end of the engine spindle two rim wheels were fastened 15 feet in diameter. These wheels were about a foot distant from each other, and in their outside edges strong round pieces of wood were fastened about 3 inches apart so as to act as cobs. On the same side of the mill was an overshot wheel 17 feet in diameter, with a width of 8 feet. It was driven by water from a spring creek. Power from that wheel was conducted to the engine by a series of round wooden pins fastened in the end of the water-wheel shaft exactly like the spoke in the hub in a wagon wheel and they worked into a large wheel on the spindle of the engine on the principle of a spur wheel. There was no valve in the engine. Instead of it was used a square hole in the side opening into a spout connected with a stuff chest. About the centre of the east side of the building was a room 10 feet square where the pulp vat stood. It was made of strong plank dovetailed together, and was shaped like a hopper. It was 6 feet square at the top and 4 feet square at the base.

A hole was cut in the side of the vat about 3 inches from the bottom; into this was introduced a pot of copper vessel 18 inches in diameter and 2½ feet long. It was securely fastened to prevent leakage and extended for 2 feet into the valve. A fire was kept burning in this pot in order to keep water and stuff at a proper temperature for the vat men. To the inside end of the pot a copper flue was attached which passed through the side of the vat into the chimney which carried off the smoke. There was no belt used in the mill. The rags were sorted, then cut by hand and supplied direct to the engine. In those days the stock was not boiled, the rags were used just as they came into the mill. Blue checks were made into gray paper which was sold for news paper. White cotton and linen rags were cleaned and dressed for writing paper. The gray paper of those days is what is now known to the trade as Scotch granite. The waste of the mill was made into wrapping paper. It usually took nine hours to wash and beat an engine full of stuff. The vat man stirred it in a stuff chest with an old-fashioned churn dasher, then dipped it into the vat with a straight-handled bail, and mixed it again before it was taken up into the mould. After the sheet was formed in the mould it was given to the coucher, who piled it upon the block, placing a piece of felting between each sheet before he put them in the press. The latter was a very strong affair; its screw was made of iron, with a square thread, having a cross-head with four holes, each big enough to admit a 6-inch lever from 16 to 18 feet long. After the paper had been placed under the press four men on the end of the lever would set it down. One hundred and twenty-five sheets, with their felts, formed a "post," and four of those "posts," separated from each other by press boards, was the regular amount put into the press at one time. After remaining there a while they were taken out, and the sheets of paper were separated from the felt. In the evening the whole day's product was put under the press, screwed down hard, and allowed to remain all night; the next morning it was taken out of the press and placed in the dry house, a one-story low building, 30 feet square, which stood a short distance west of the mill.

When the sheet was forming in the mould the shaking would bring the knots to the surface, and it was customary when pressing and drying the paper to keep the lumpy side up. These lumps were then removed by a woman, who scraped the surface with a shoemaker's knife before the paper was counted.

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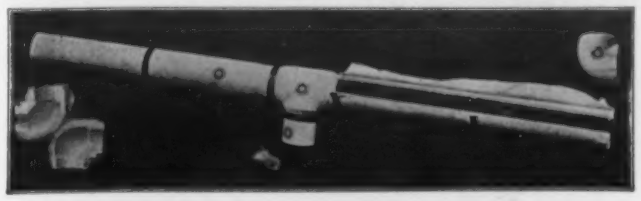

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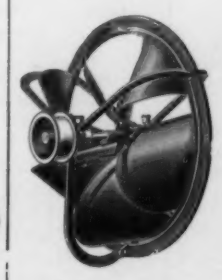

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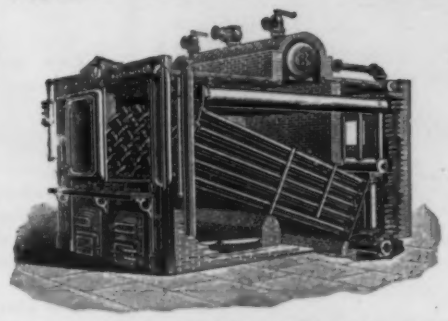

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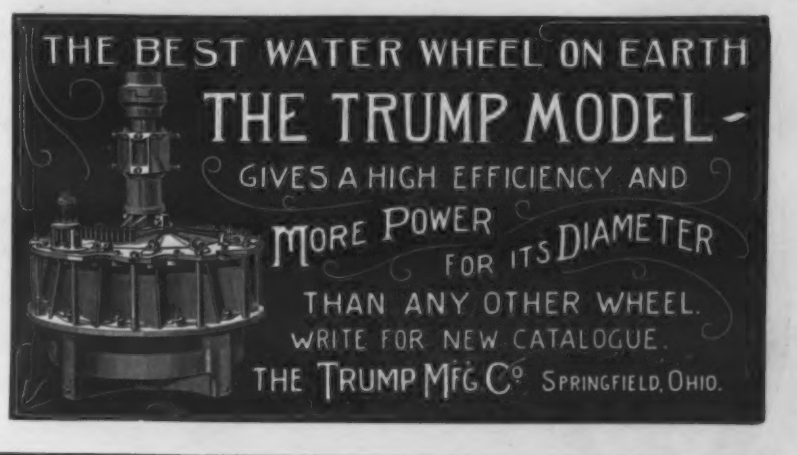
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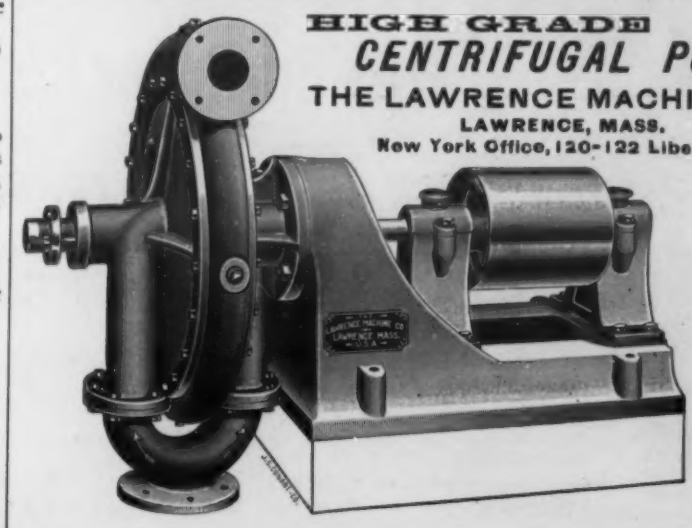

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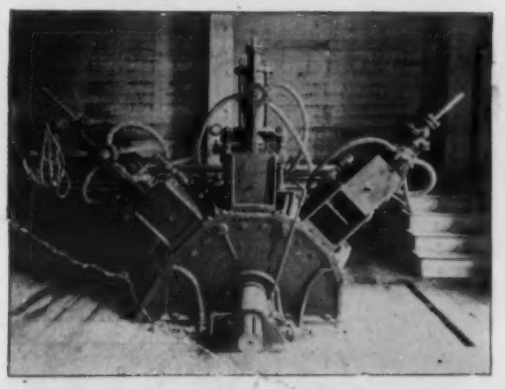

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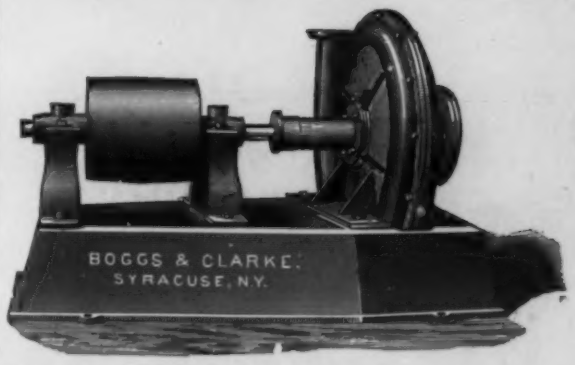

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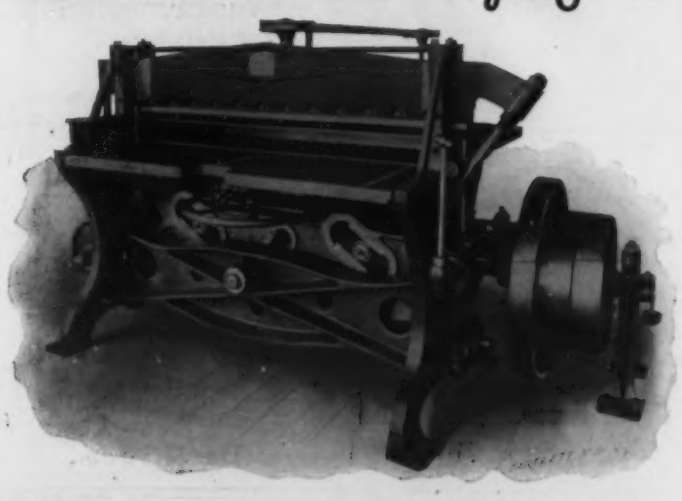

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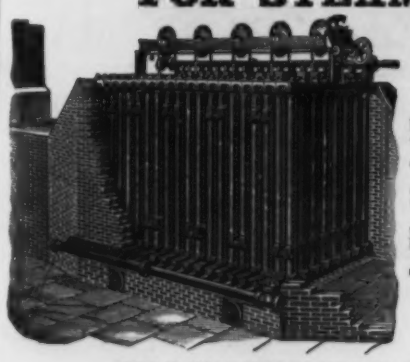

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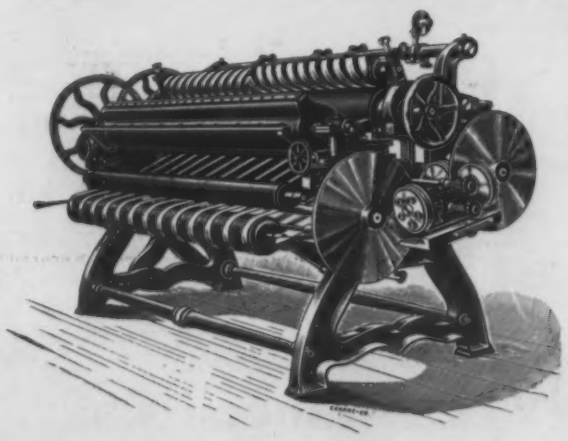

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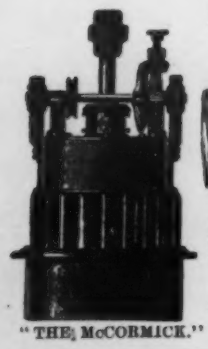

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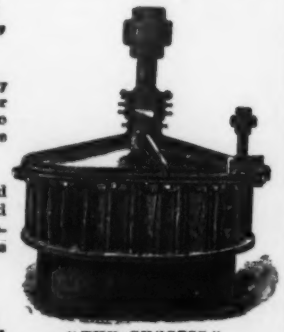

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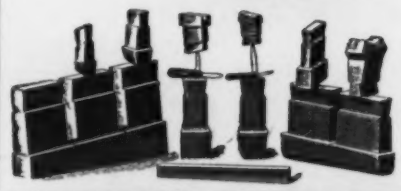

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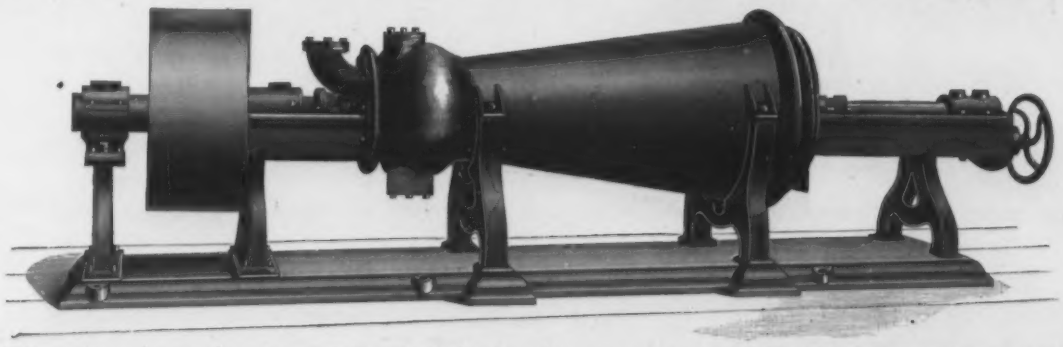

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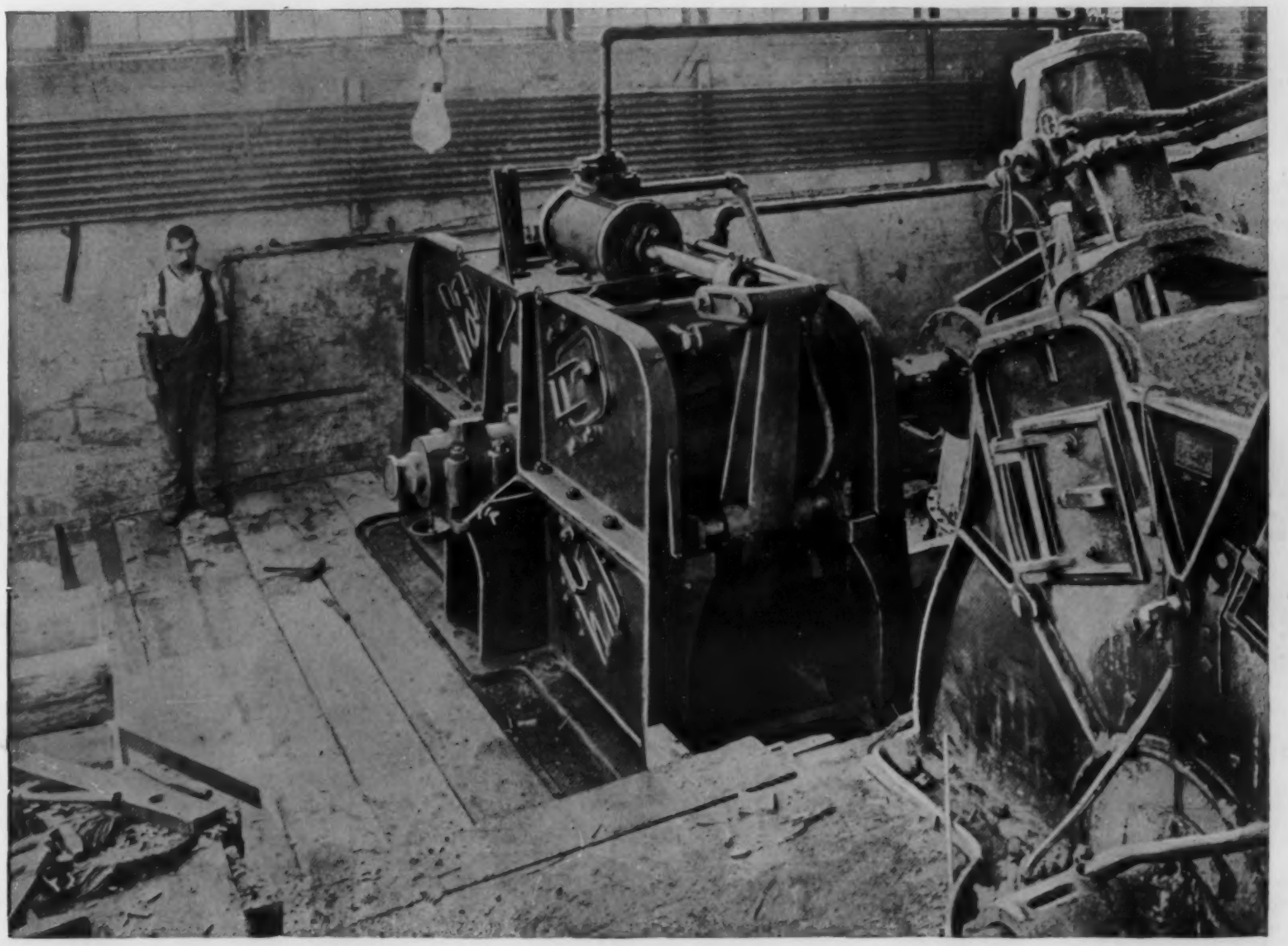

Report of Test made December 23 and 24, in Pulp Mill of Genesee Paper Co., Rochester, N. Y.

1896.	Diameter of Wheel.	Working Head of Wheel in feet.	Tabled Power of Wheel.	Revolutions of Wheel per Minute.	Diameter of Cylinder.	Pounds Pressure on Gauge.	Total lbs. Hydraulic Pressure against Stone increased by average of 29 per cent.	Time in min. Grinding half cord 24 in. Rossed Wood.	Cords Ground in 24 hours.	Pounds Pulp in Cord Rossed Wood.	Tons Pulp in 24 Hours.	Horse Power per Ton.	*Challenge Grinder.*	
December 23.	33 in.	28 ft.	263	230	16 in.	85	20,669	117	6 1/10	2,375	7½	37	Horse Power per ton.	*Test No. 1.*
December 23.	33 "	28 "	263		16 "	105	25,532							
December 23.	33 "	28 "	263	180	10 "	85	20,028							
December 23.	33 "	28 "	263		10 "	105	24,740	0	0	0	0	0	The wheel driving	*Three Cylinder Machine. Test No. 1.*
December 23.	33 "	28 "	263	Three Cylinder Machine stopped dead at this pressure, and the machine could not grind a pound of pulp, while Challenge Grinder was running out Test No. 1. An absolute demonstration of the great saving of power in our machine.										
December 23.	33 "	28 "	263											
December 23.	33 "	28 "	263											
December 23.	33 "	28 "	263	220	16 in.	80	19,453	89	8	2,375	9½	28	Horse Power per ton.	*Challenge Grinder. Test No. 2.*
December 23.	33 "	28 "	263	240	16 "	80	19,453							
December 23.	33 "	28 "	263	232	16 "	80	19,453							
December 24.	33 "	27 "	248	90	16 "	90	21,884	100	7½	2,375	8½	29	Horse Power per ton.	*Test No. 3.*
December 24.	33 "	27 "	248	90	16 "	90	21,884	94	7⅞	2,375	9	27½	Horse Power per ton.	*Test No. 4.*

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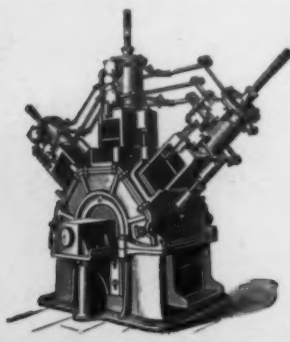

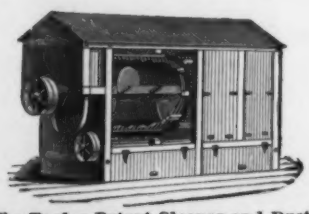

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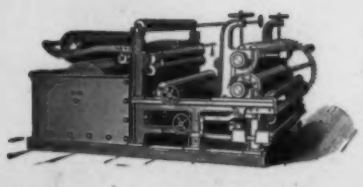

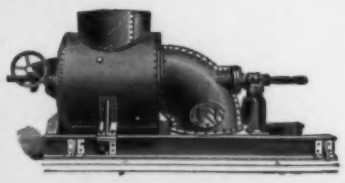

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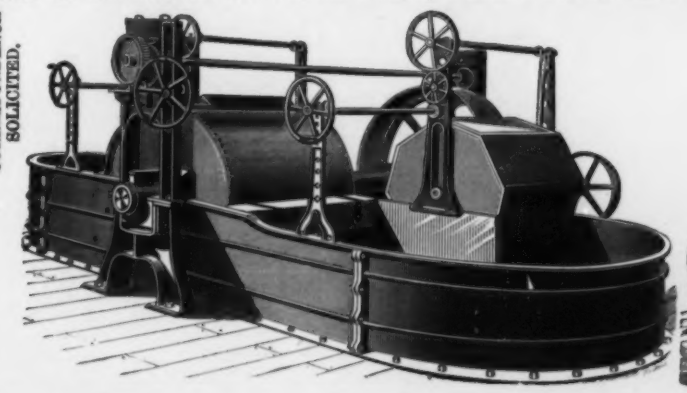

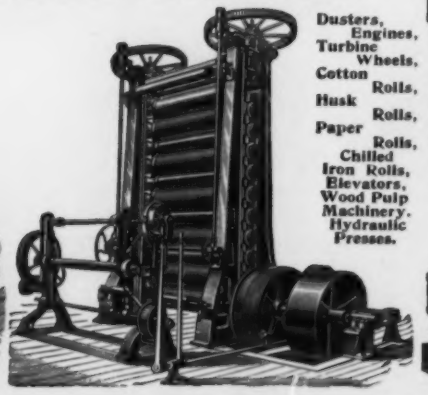

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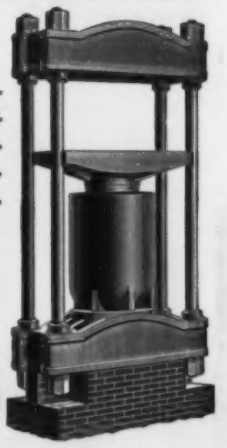

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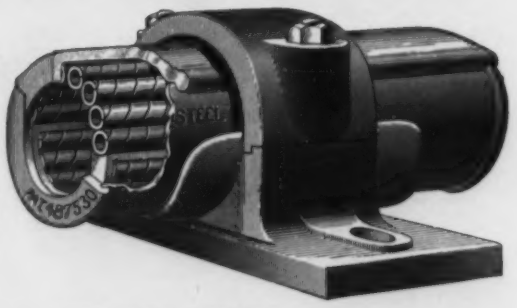

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PART II.

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CHAPTER II.—**Fibres.** Cellulose in its relations to the plant; the vegetable cell; the cell wall; changes which occur in the cell wall; lignin or incrusting matter; its chemical properties; characteristic markings of the cell wall in different fibres; characteristic cells other than fibres in different pulps. Classification of fibres: 1. Seed hairs; cotton, chemical and physical character of fibre, dimensions, analyses. 2. Bast fibres, as linen, jute, hemp, manilla, rhea, ramie, agave, sisal, adansonia, &c.; occurrence in plant, separation of filaments; character, size, distinguishing features of filaments and ultimate fibres, analyses and chemical properties. 3. Fibres and other cells from whole stems and leaves, as straw, esparto, bamboo; measurements and characteristics of fibres, yields, analyses; characteristic cells found with fibres. 4. Wood fibres; growth of wood; cambium layer; spring and autumn wood; sap and heart wood; resins; bark and knots; analyses of woods; specific gravities; ash; fuel values; occurrence and character of all woods used for pulp making.

CHAPTER III.—**Processes for Isolating Cellulose.** Rag boiling; special treatments for various fibres, as jute, straw, esparto; review of miscellaneous processes for treating wood; the water process; aqua regia, &c.; the soda process, history; preparation of liquors, boiling, washing, recovery, sources of loss; analyses of chemicals and liquors; the sulphite process, history; general principles; the different systems; liquor apparatus; preparation and analyses of liquors; digesters; linings; boiling; subsequent treatment of pulp; waste liquors; recovery. The sulphide and sulphate processes.

CHAPTER IV.—**Bleaching.** General principles; bleaching agents; bleaching powder; deterioration; analyses; preparation of bleach liquors; use in chests, engines, drainers; hot bleaching; acid bleaching; use of alum; chlorination and oxidation of fibre; washing stock, antichlors; loss in bleaching; ozone bleach; hydrogen peroxide; permanganate; sulphurous acid; special processes for various fibres.

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CHAPTER VI.—**Coloring.** Mineral colors; vegetable and animal colors; aniline colors; chemical properties; effect of alum and traces of bleach or alkali in different colors; distinguishing tests, effect of different waters.

CHAPTER VII.—**Water and Water Supply.** Character and analyses of different waters; ground waters; surface waters; river water; artesian well water; hard and soft waters; boiler scale; effect of waters on size and colors; various systems of filtration; use of alum; softening water; self-purification of streams; natural filtration; effect of storage; vegetation in ponds; crenothrix; consumption of bleach by waters.

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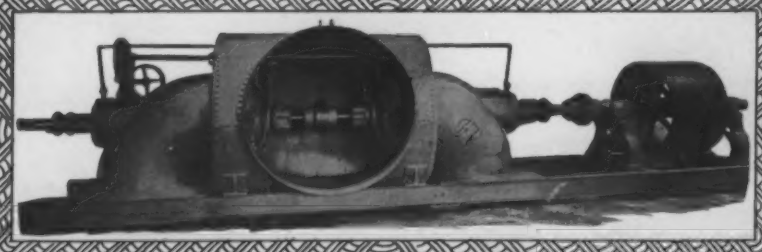

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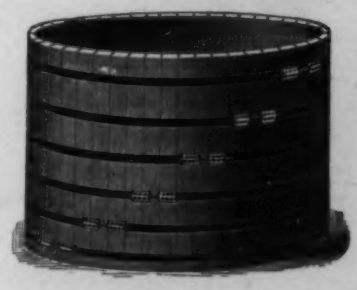

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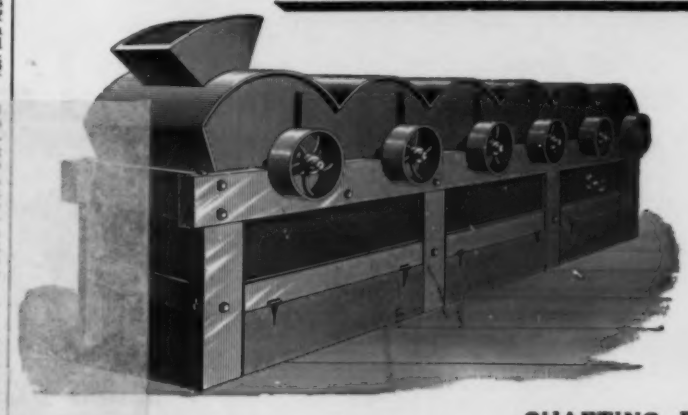

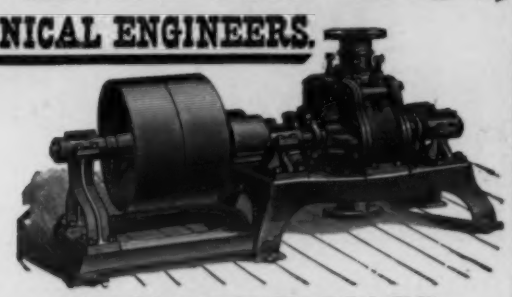

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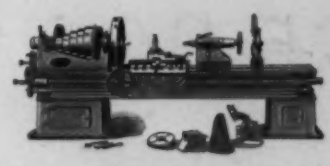

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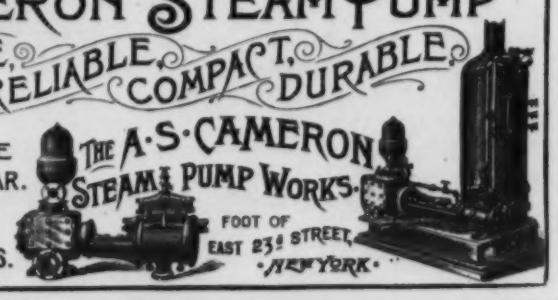

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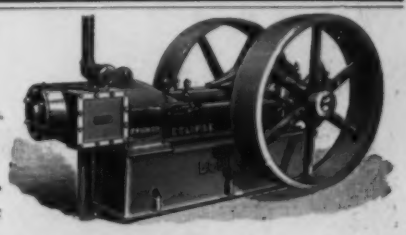

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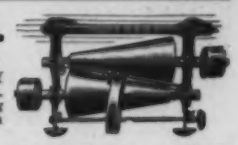

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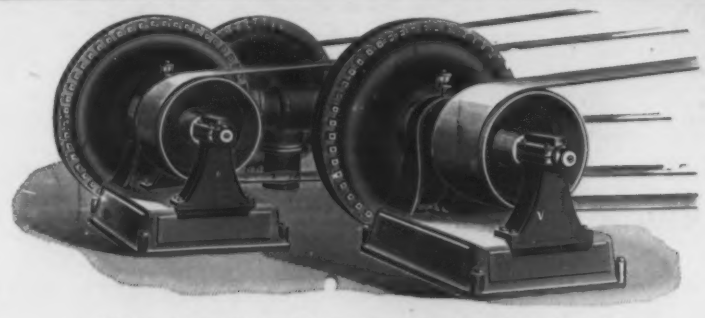

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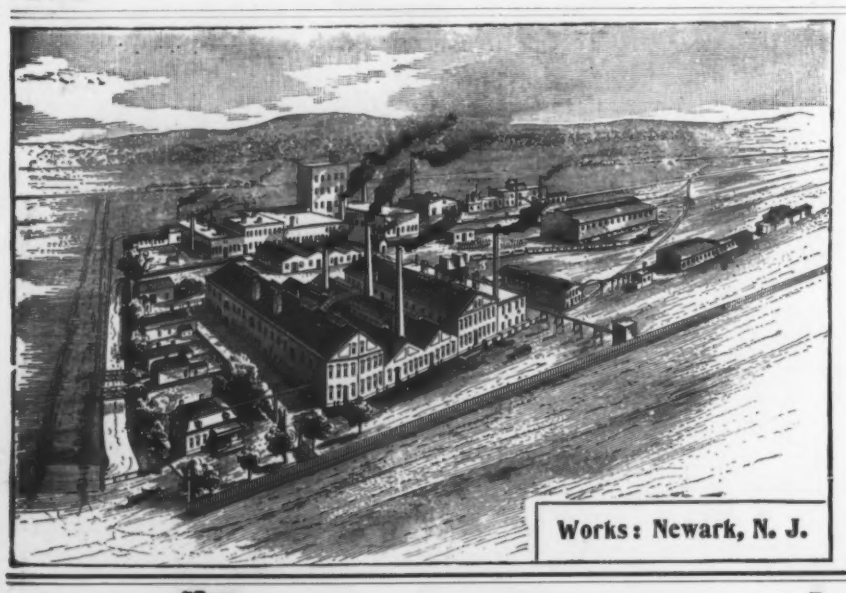

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American Ultramarine ...and Globe Aniline Works.

Brands for Paper Makers:
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FOR PAPER MAKERS.

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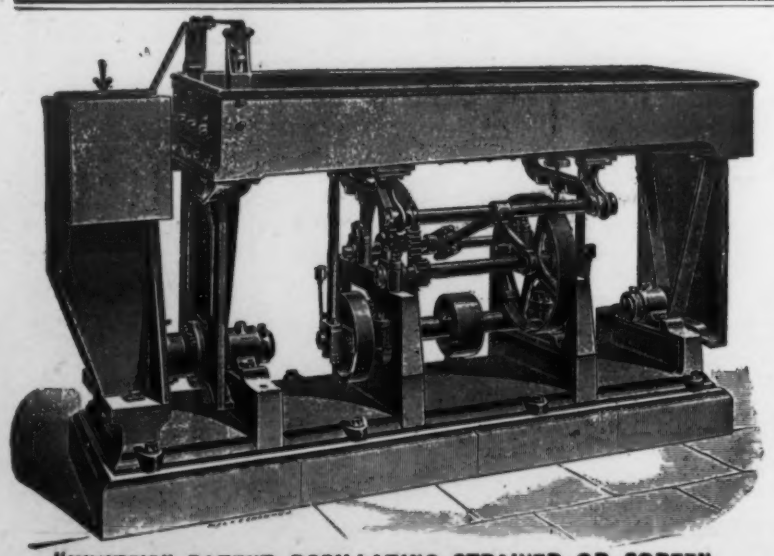

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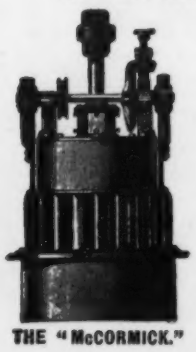

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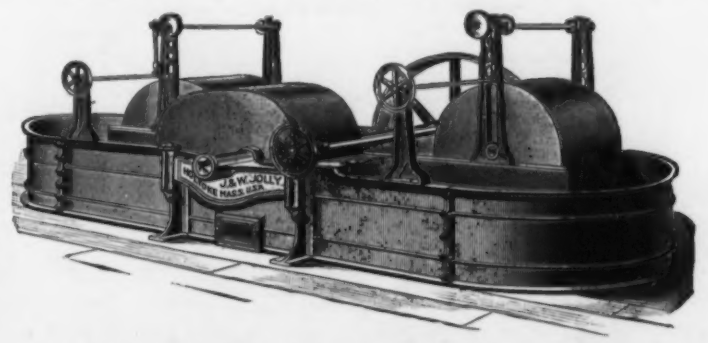
Both Vertical and Horizontal.



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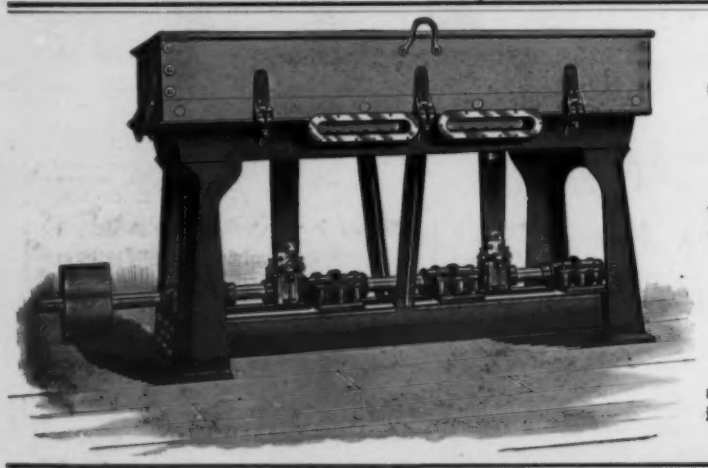

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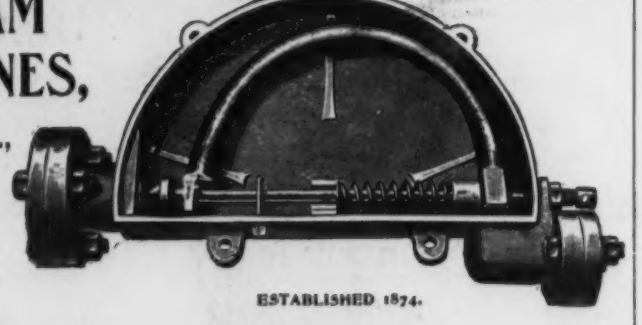

ESTABLISHED 1874.

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Does an investment that may pay you
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Particulars for the asking.
If I fail to save you money the traps

COST YOU NOTHING.

NOTICE!

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Therefore be it known that all persons are hereby cautioned against illegally using, making or selling said continuous process or any apparatus appertaining thereto under penalties governing such cases.

S. S. STEVENS,
Patentee and Manufacturer,
NORTH HOOSICK, N. Y.

PATENTS

Procured promptly and with care. Trade marks, caveats, designs, etc. Moderate fees.

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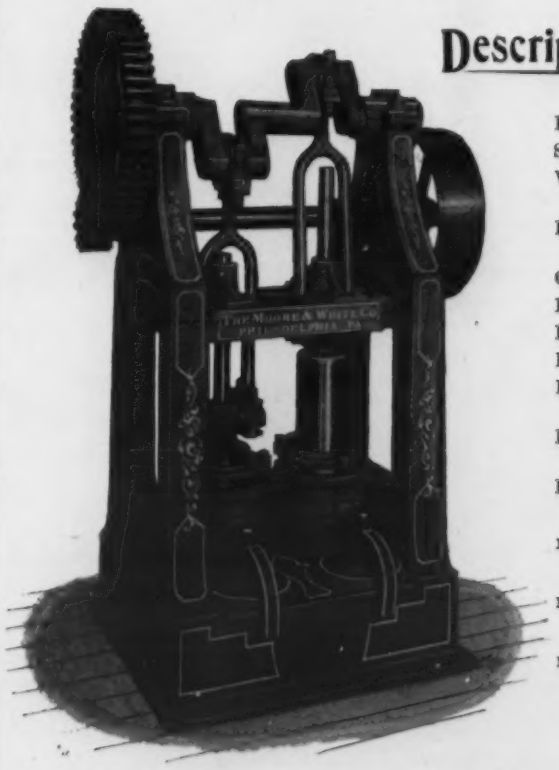

Description:

Bronze Plungers.
Steel Crank Shaft.
Wrought Iron Forged Connecting Rods.
Brass Boxes made Adjustable for Wear.
Geared 4 to 1.
Pulley, 20 × 6 inches.
Easily Packed.
Easy Access to Valves.
Brass Ball Valves with Rubber Seats.
Heavy, Simple and Durable.
Built in Three Sizes.

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...ESTABLISHED 1878

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Our patent dovetailed dandy is the strongest and lightest roll on the market.

Brass, Copper, Bronze and Iron Wire Cloth for Pulp and Paper Mills.

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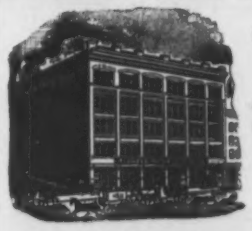

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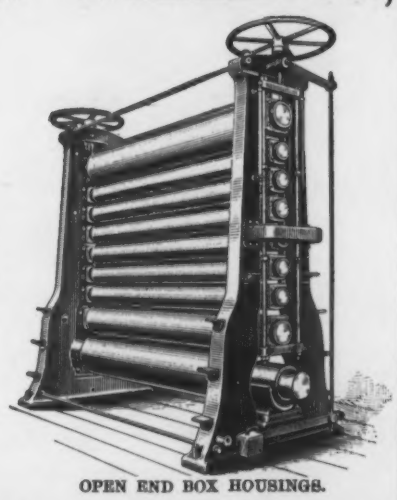

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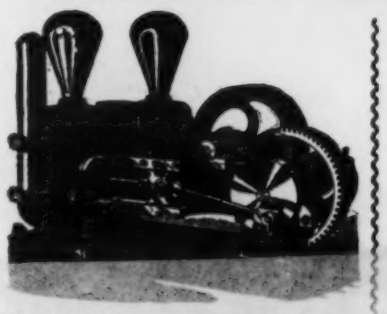

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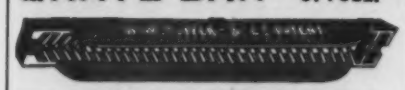

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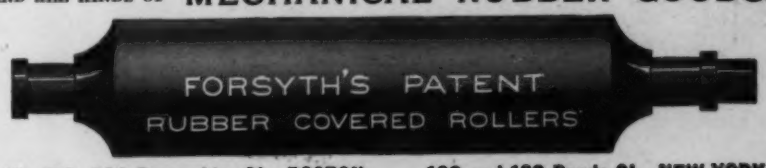

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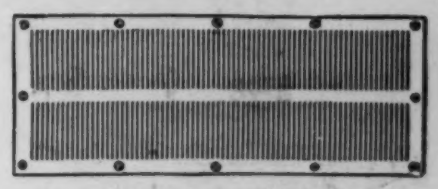

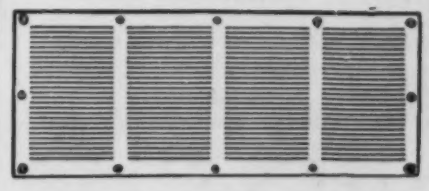

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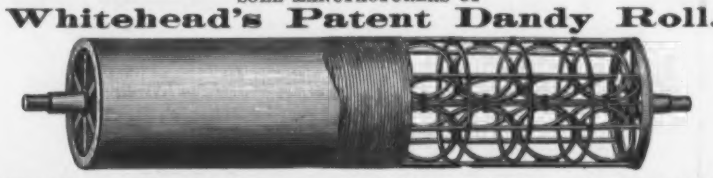

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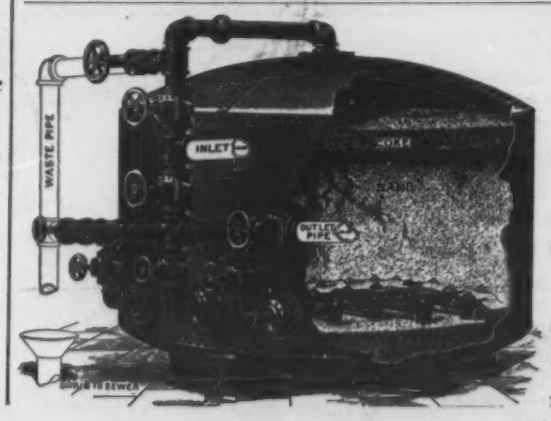

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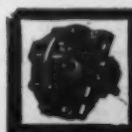

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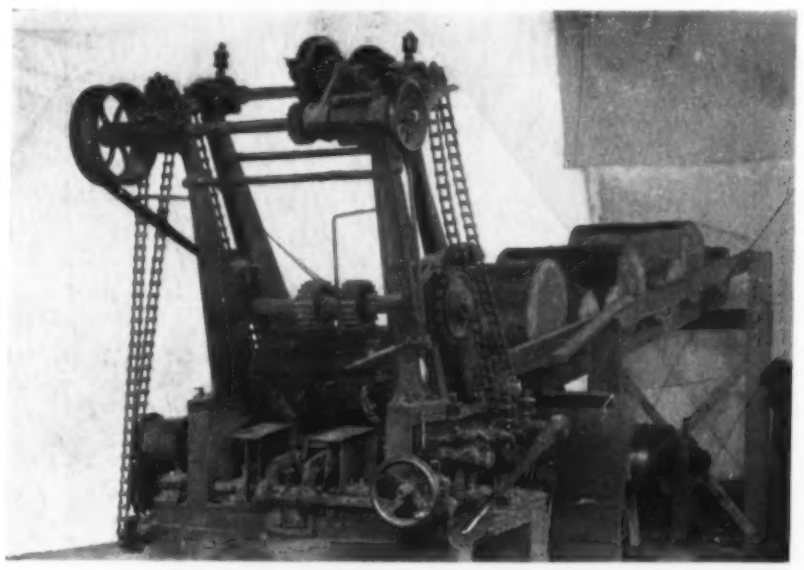

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